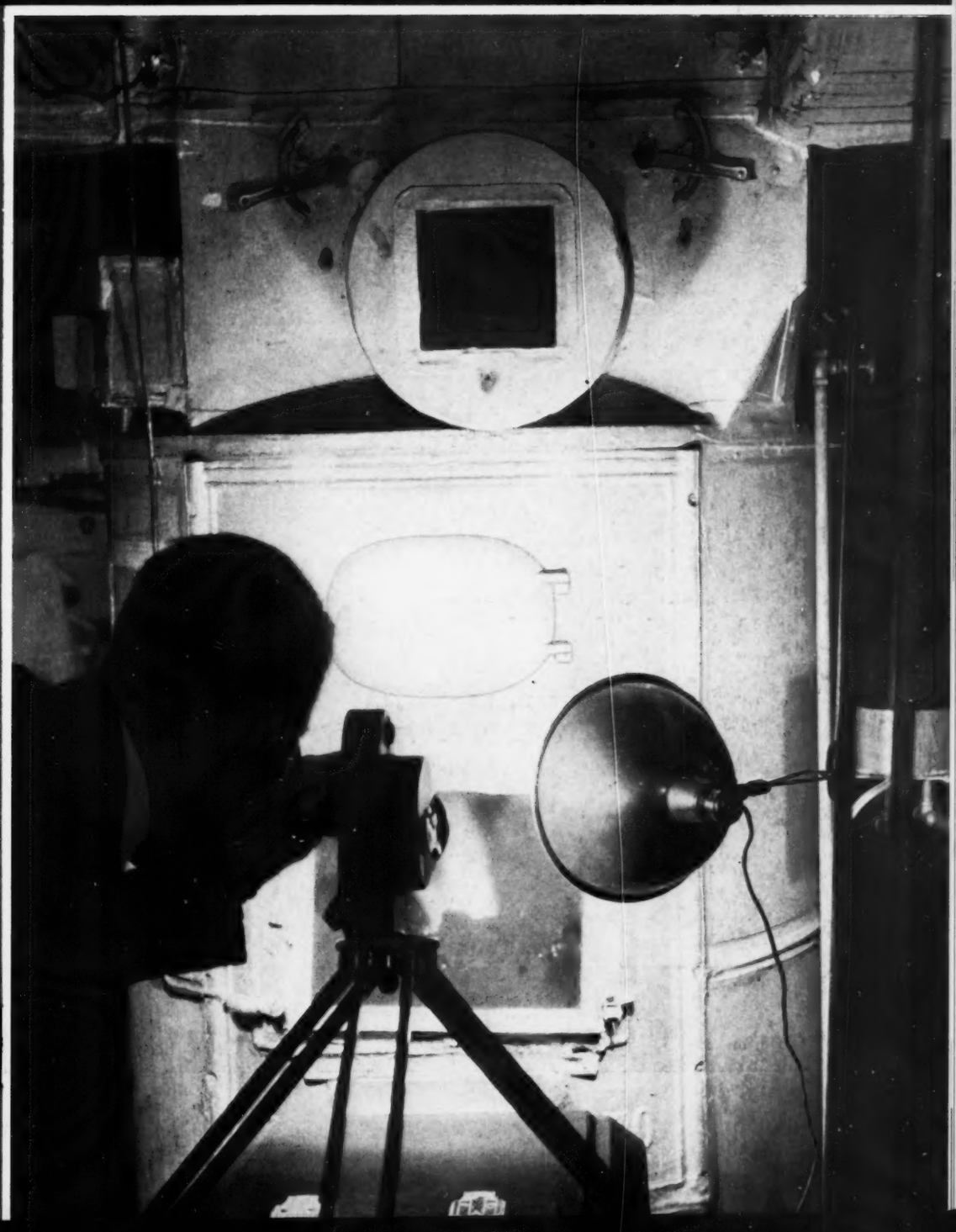
AMERICAN ARTISAN

WARM AIR HEATING • AIR CONDITIONING
SHEET METAL CONTRACTING

AIR CONDITIONING SECTION
PAGE 51



ESTABLISHED 1880

MARCH 1939

LAMNECK SERIES 700 SYSTEM
PREFABRICATED DUCT AND FITTINGS

Cuts INSTALLATION COST TO THE BONE

• An outstanding feature of Lamneck Series 700 System is its amazingly simple method of assembly which *cuts installation cost to the bone.* The duct and stack are assembled by simply slipping the two sections together at the seams, then placing a special Duct Connection over the end which snaps into place and locks the joint securely.

In the same way additional lengths are snapped into place on the other end of the Connection and the resulting assembly is leak-tight, rigid and substantial. There's no laborious fitting, no setting or forming of seams, no notching of duct, stack or fittings. The whole operation is done quicker than it takes to describe it. The consequent reduction in labor cost produces unbelievable savings and possibilities for increased profit.

• • •

With greatly speeded up assembly, Series 700 System combines standardization on far less parts. Yet it is so much more flexible than any other system yet produced that a far wider and more diversified range of installations can be taken care of.

FEWER PARTS
LESS CUTTING
EASIER ASSEMBLY

Here's another important saving. Far less cutting of duct work is required and the small amount still necessary is so simple that any one can do it with ease and a minimum of waste.

Get the whole story of the money-making possibilities of Series 700 System for you. Write for LAMNECK SERIES 700 CATALOG. This interesting book has been specially prepared to help you to bigger profits.

LP INC.

LAMNECK PRODUCTS, INC.

414 DUBLIN AVENUE • COLUMBUS, OHIO

PREFABRICATED DUCT AND FITTINGS FOR ALL TYPES OF RESIDENTIAL WARM AIR HEATING AND AIR CONDITIONING SYSTEMS

Treat Yourself..

TO THIS PACKAGE FULL OF PROFIT!

with the New

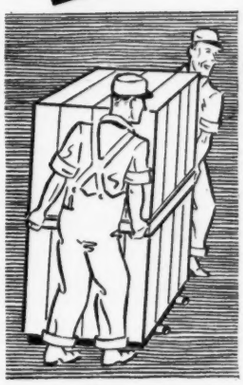
CHALLENGEAIRE PACKAGE-UNIT

SAVES 3 *You ways*

1 *On* INSTALLATION: SHIPPED COMPLETELY ASSEMBLED READY TO INSTALL

2 *On* WIRING: BLOWER, MOTOR AND ALL CONTROLS ARE MOUNTED AND WIRED

3 *On* SERVICE CALLS: EQUIPPED WITH TROUBLE-FREE *Multiple-Stage* BURNER



The Challengeaire is only 24" wide, 43" long and 54" high, and can pass through any door before it is uncrated—thus saving handling time and at the same time protecting the finish of the unit until it is ready to be put in operation.

Treat yourself to the best furnace news in 1939—Lochinvar's new automatic oil-burning winter air-conditioning unit—the CHALLENGEAIRE. This package unit is designed and priced to sell the volume market of small home builders.

The new CHALLENGEAIRE is shipped completely erected and assembled with all controls mounted in position and wired, so your saving is not only on your first cost, which is the lowest, but on your cost of installation as well. It is small enough to pass through the average door when crated, yet it has sufficient capacity to heat the average five-room house. IT IS THE FURNACE OF THE YEAR, SO WRITE TODAY FOR LITERATURE AND PRICES.

DON'T FAIL TO READ THESE FEATURES!

1. RADIATOR OR HEAT ECONOMIZER, giving extra heating surface and reducing stack temperature to a minimum.
2. ACCESS DOOR to filters, blower and motor.
3. FILTERS, fireproof, can be removed when necessary.
4. BLOWER MOTOR, mounted and wired.
5. BLOWER, maximum C.F.M. capacity 1,000.
6. HEAVY STEEL BASE, entire furnace mounted on base.
7. COMBINATION BLOWER AND LIMIT CONTROL, mounted and wired.
8. COMBUSTION CHAMBER DOOR OPENING.
9. LOCHINVAR MULTIPLE-STAGE BURNER, no moving parts, nothing to wear out or replace.
10. OIL CONTROLS AND TRANSFORMER, mounted and wired.

Get complete information on Lochinvar's three other furnace models and complete line of oil-burning water heaters.

Lochinvar

LOCHINVAR CORPORATION

14247 TIREMAN DEARBORN, MICH.

LOCHINVAR CORPORATION
14247 Tireman Ave.
Dearborn, Mich.

Please send complete information on the following units
☐ CHALLENGEAIRE ☐ Model 100-A ☐ Junior-Aire ☐ Model 100 ☐ Lochinvar's Automatic Water Heater.

Name.....

Street.....City.....State.....

In This Issue

FOR those who may wonder what this month's cover is all about, we hasten to disclose that the camera shows the furnace in the Research Residence fired by a stoker, while the photographer photographed is taking a moving picture of the flame under the "on" and "off" cycles of stoker operation. Part 2 of the report on stoker-furnace operation appears on page 56.

★

Conventions have been coming fast and furious during the year so far, with Michigan and New York just completing their meetings (reports will appear in the April issue) and two reports in this issue covering Wisconsin (page 35) and Ohio (page 75).

★

In this issue there are two business articles particularly interesting. On page 38 we publish a two-part questionnaire whereby a Washington contractor checks on the claims of applicants for jobs and then rechecks with the employers who were supposed to employ. Also, this questionnaire has an ingenious method for checking the applicants claims without asking questions. The second business article (page 40) is by B. F. John, Philadelphia, long known to the industry for his work in Philadelphia on bookkeeping. Mr. John takes two financial reports and shows exactly where the contractors made a profit or lost it. The figures shown are actual shop records. Two supplementary articles to follow will compare additional shop records.

★

With so much interest in codes and ordinances, particularly those codes containing provision for licensing, readers should be interested in the revised Toledo, Ohio, code which now includes mechanical warm air heating. Readers will remember the former code which covered only gravity. How the revisions were made without submitting the changes to the local council for wrangling, is fully explained. The first part of the code appears on page 47.

★

Incidentally, copies of this code are available by writing to H. C. Bitter, Secretary, Toledo Sheet Metal and Roofing Contractors Association, 714 George St., Toledo, Ohio. At this writing the codes will be sent free of cost, but readers are asked to send mailing postage (6c).

AMERICAN ARTISAN

With which is merged

FURNACES AND SHEET METALS AND Warm-Air Heating

Covering All Activities in

Gravity Warm Air Heating — Forced Warm Air Heating
Sheet Metal Contracting — Ventilating
Air Conditioning

J. D. Wilder, Editor — **A. A. Kennedy, Assistant Editor**

Vol. 108, No. 3 — **March, 1939** — **Founded 1880**

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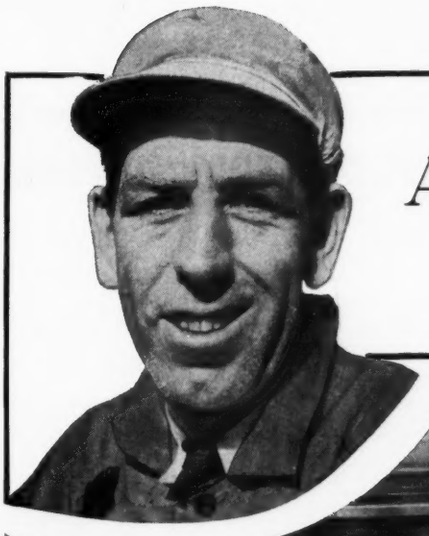
More than 8,000 Copies of this Issue are being distributed



Another Record for Casey!

by Tim Shears

This Monel display case, one of seven in a fish market, is what Tim Shears would call "a cinch for any sheet metal man."

YOU'VE heard about Casey at the Bat. But did you ever hear about his famous sprint? He timed himself on a race around the block. But his watch had stopped... so he did it in nothing flat! "Begorrah!" says Casey, "if I didn't have to stop and lace me shoe *I'd have done it even quicker!*"

I'm just through spinning this yarn to some of the boys when the boss gets an idea. "Tim," he says, "suppose *you* take a run around the block? There must be a pile of easy jobs in Monel... all within a stone's throw. See how many you can spot. And tip off some of your contractor friends on how to make an extra dollar or two."

A couple of minutes later out in the clean fresh air my nose leads me right into what he was talkin' about. *Seven glass-topped display cases in a fish market*... an' all made of Monel. They tell me Monel is a swell metal for covering the tops of fish-cleaning tables, too. Also for display windows, scale pans, refuse cans . . . and any other place where there's wet and salty fish.

Within an hour or two... maybe three ... I find a candy table and a fruit and nutmeat tray in a candy store; a glass-washing sink, water dispenser, cook's table, and range and oven hoods in a restaurant; also trucks, chutes and starching and sorting tables in a laundry. Every one of these jobs was made in Monel... a cinch for *any* sheet metal shop.

The owners tell me they prefer Monel because candy, fruit, food an' what-have-you are easy to clean off, and don't leave stains. Also, they don't have to treat Monel gentle!

Back in the office I report to the boss. But the reception he gives me is full of static. "Tim," the Big Cheese starts off, "I wouldn't call that a *bad* morning's work. But it ain't so good either. You take me too *literal*. Two blocks *past* the restaurant there's a school. If you'd gone that far, you'd have seen Monel-topped tables in the domestic science room and the lab, a heap of Monel jobs in the cafeteria, and Monel flower boxes all over the place."

Is *my* face red! But I comes right back at the B.C. "Don't tell me about the hospital four blocks past the laundry," I begs. "I was in there yesterday. They've got Monel chutes, food boxes, laundry trucks, work and utility tables ... and even Monel *dumb waiters,*" I adds, looking at him like he was dumb himself. "Besides," I winds up, "I'm getting the low-down on how to find easy jobs where you don't expect 'em. Every sheet metal man knows already that schools and hospitals are full of jobs for Monel."

* * *

If you have any questions about *fabricating* Monel just drop me a line. In the meantime, keep your eyes peeled for Monel jobs . . . *there's money in 'em!* TIM SHEARS.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street New York, N. Y.

"Monel" is a registered trade-mark of The International Nickel Company, Inc., which is applied to a nickel alloy containing approximately two-thirds nickel and one-third copper.

Rockefeller Center

AIR-CONDITIONING EQUIPMENT HAS 100 SKF-EQUIPPED FANS

THOUSANDS of tourists and talented players who swarm daily into the Music Hall, Center Theater, and other buildings at Rockefeller Center, little realize how the fresh air they breathe is carefully filtered and brought to them. They seldom think of a battery of nearly 100 SKF-equipped fans from 3' to 16' in diameter that are located in out-of-the-way places difficult to get at.

SKF Bearings are invariably selected for outstanding engineering projects because engineers learned long ago to depend on them for *quiet, efficient* and *smooth* operation. 4278

SKF INDUSTRIES, INC., PHILADELPHIA, PENNA.

Not only do SKF Bearings work well on BIG fans, but on thousands of warm-air furnace and attic fans, too. Once they are installed, you can forget them.

The right answer to any air conditioning problem

FITZGIBBONS

complete line of residential conditioners

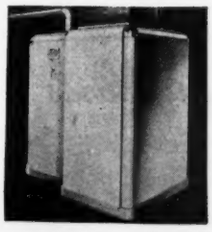
Here's a line without a gap — a line that enables you to meet any air conditioning requirement with a unit that's just right for its job. Every one a FITZGIBBONS — and that means SATISFACTION in air conditioning.

Check them over — then mail the coupon.

SPLIT-SYSTEM CONDITIONERS

THE BOILER-AIRCONDITIONER

Gives filtered, tempered, humidified air for selected rooms, economical steel boiler radiator heat for other rooms (such as kitchen, bath, garage) and year-round domestic hot water. A complete unit with any oil burner, gas burner, stoker.



THE FITZGIBBONSAIRE

Is designed as a companion unit with the Fitzgibbons steel boiler. May be installed without regard to boiler location. Provides filtered, tempered, humidified air for selected rooms.

THE FITZGIBBONSAIRE, Jr.

A smaller unit, works with any Fitzgibbons steel boiler, and conditions air for one or two rooms only or similar limited service. Inexpensive installation, and popular for adding conditioning in existing homes.

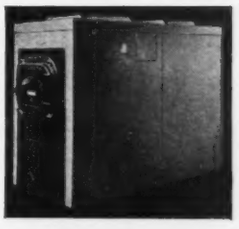
DIRECT-FIRED CONDITIONERS

THE DIRECTAIRE

A steel furnace unit with outstanding efficiency, ease of cleaning, quietness, fuel-saving. Made in all required capacities, easy to install. Works with any type of oil or gas burner or stoker.

THE "SPECIAL-80" DIRECTAIRE

A direct-fired conditioner with the same high quality Fitzgibbons construction and material throughout, but designed, sized, and priced especially for the small home. Recognized as a big step forward in vastly broadening the conditioner market.



SUMMER COOLING

THE FITZGIBBONS COOLING SYSTEM comprises a complete line of compressors adaptable for the addition of summer cooling to any Fitzgibbons conditioner. This addition may be made when conditioner is installed, or at any time thereafter.

HERE'S A LINE
YOU CAN SELL
Authorized dealership still obtainable in certain selected territories. Get all the facts—write or wire today—mail the coupon immediately.

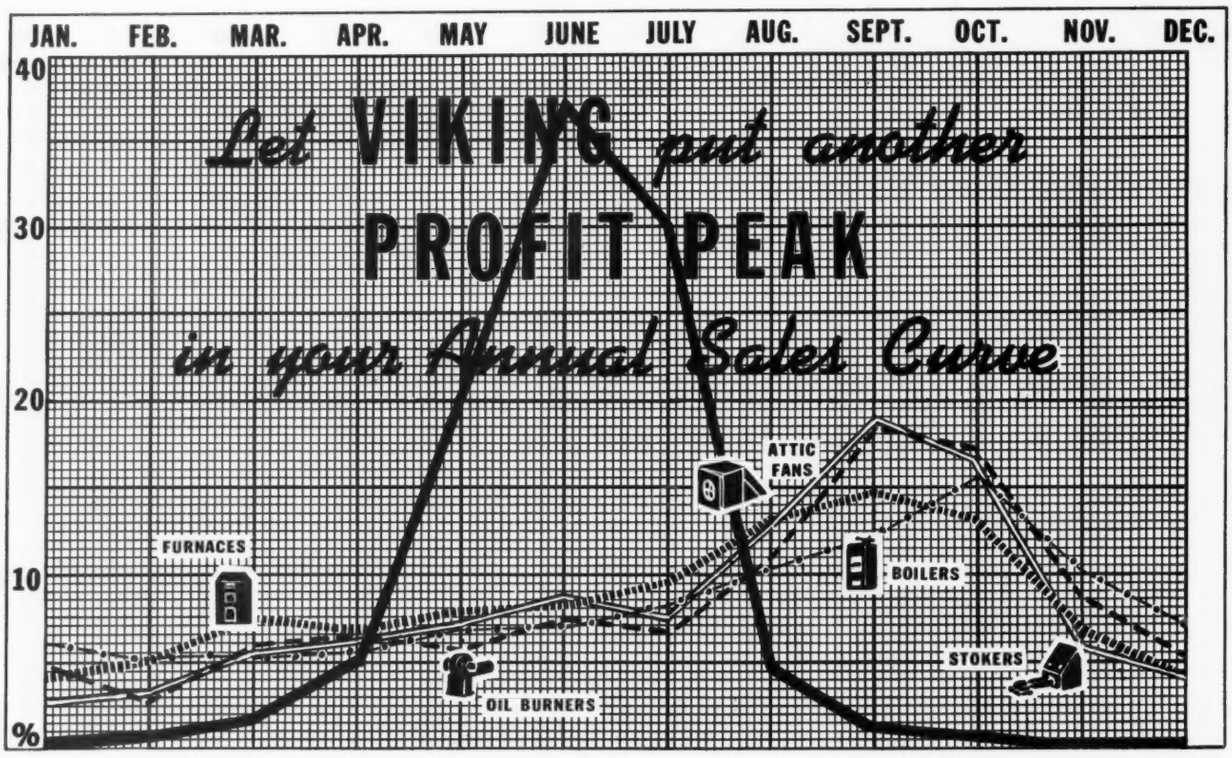
AA-3

FITZGIBBONS BOILER COMPANY, INC.
101 Park Ave., New York, N. Y.

Send me full details about the Fitzgibbons line of Air Conditioners and about the Fitzgibbons Authorized Dealer Franchise.

Name.....

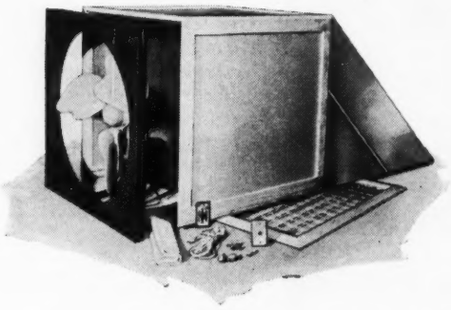
Address.....



Get *Your* Share of this profitable Viking ATTIC FAN Business

● When you reach the 1939 seasonal summer slump in the heating business, VIKING can come to your rescue with its fast-selling line of streamlined attic fans. The VIKING is not "just another" fan thrown together to sell at a price. It is expertly engineered for greatest efficiency, with many new and exclusive improvements. Backed by VIKING'S reputation and supported by powerful sales-producing promotion material for dealers, it will build a new profit peak for you, just when you need it most.

VIKING AIR CONDITIONING CORPORATION
Main & Center Streets • Cleveland, Ohio



VIKING *Sets New Standards*

VIKING has always led the field. Since its founding it has maintained a policy of steady, progressive development. Through its engineering and research laboratories many new developments have been designed and introduced first on Viking equipment, which have now become standard application throughout the industry. *These advantages are offered to you. Viking leadership can also mean leadership for you in your community.*

Write today for Complete Information, showing how you can make the most of this profitable summer "home-cooling" business.

VIKING AIR CONDITIONING CORPORATION

New Type of AUTOMATIC TEMPERATURE CONTROL

Gives Positive Action of Hydraulic Brakes

FRIEZ "Hydraulic-Action" Control Insures ACCURACY and RELIABILITY Never Before Approached

HYDRAULIC ACTION CONTROL FRIEZ BALTIMORE

An entirely new standard of brake performance resulted when automotive engineers perfected hydraulic brakes. Using the same positive-action hydraulic principle, Julien P. Friez & Sons now bring you greatly improved automatic temperature control in the new Friez "Hydraulic-Action" controls.

Friez controls on your heating and air conditioning installations will give you these six outstanding advantages:

- ***Positive Snap-Action and Contact*** . . . making controls immune to any normal vibration or "off-level" installation.
- ***Heavy Load-Carrying Capacity*** . . . unlimited power made possible by heavy, positive-acting switch mechanism.
- ***Permanent Accuracy of Control*** . . . allowing visible-dial adjustment of desired differential.
- ***Trouble-FREE Service***. . . complete sealing eliminates costly service calls and replacements.
- ***Unusual Ease of Installation*** . . . and ease of adaptability to special requirements.
- ***Handsome and Modern in Appearance*** . . . harmonizing perfectly with modernly styled products.

These important advantages of Friez "Hydraulic-Action" controls are made possible by a remarkable engineering development. The sensitive element is charged with a solid liquid having expansion characteristics comparable to those of a solid steel bar. This charge is capable of delivering high actuating pressures and insures positive action.

JULIEN P. FRIEZ & SONS BALTIMORE MARYLAND

Division of Bendix Aviation Corporation

"Hydraulic-Action" Controls are Offered in Collaboration with White-Rodgers Electric Company, St. Louis, Mo., Originators of the Patented Principle Employed

Use the Selling Advantages of FRIEZ "Hydraulic-Action" Controls

Friez features will sell your customers and keep them sold. The positive-action and trouble-free service of Friez controls means satisfied customers and more profits for you. Mail coupon today for full information!

FRIEZ "Hydraulic-Action" Available In Controls for All Purposes

Combination Blower and Limit Control

This control consists of a standard Warm Air Limit Control and a standard Blower Control operating independently, but housed in one compact case. Fast acting thermal elements and independently adjustable differentials permit adapting control to individual installations. Range — single-speed Blower Switch 100° to 300°F.; Limit Switch 100° to 300°F. Adjustable differential 10° to 80° F. Switches have sufficient capacity to control a 1½ h.p. repulsion induction motor without the use of a relay.

TYPE LF/19

COUPON BRINGS FULL INFORMATION!

JULIEN P. FRIEZ & SONS
Division of Bendix Aviation Corporation,
Baltimore St. and Central Ave., Baltimore, Md.

Gentlemen: I am interested in giving my products the six superior features made possible by the new FRIEZ "HYDRAULIC-ACTION" controls. Please send complete information.

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*Individual*_____

*Street No.*_____

*City*_____ *State*_____

AA-339

H&C Interchangeable FACES AND FRAMES MAKE YOUR STOCK FLEXIBLE

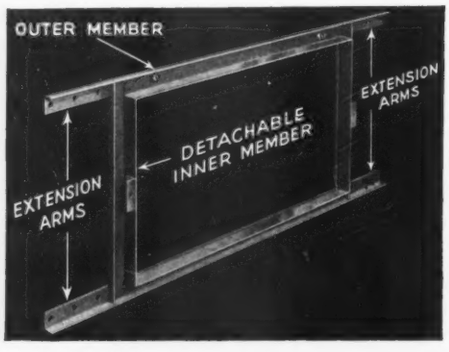
• and Save You Time and Money

No. 2 BAND IRON FRAME
offers a simple, inexpensive means of connecting the register to the stackhead. Suitable for sidewall installations in old or new construction. Sponge rubber gasket, furnished as standard attached to face, prevents air leakage and streaked walls.

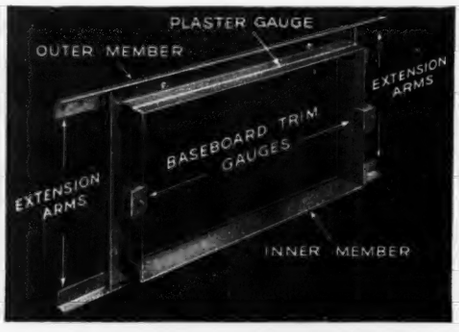
No. 5 BASEBOARD STACK FRAME
This easy-to-install frame may be used on old or new house work. The frame is simply screwed to the wall through holes set at an angle so that screws engage studs. Forms solid foundation for register and stackhead.

With just two types of faces—one with projection, and one without projection—and with the regular H & C frames, you're all set to meet practically all installation requirements. The various H & C Grille Designs may be used without installation frames or with the four frames shown. If desired, the completely assembled registers and frames may be purchased; but for utmost flexibility the faces and frames should be ordered not assembled. By taking advantage of the H & C interchangeability feature you can keep your stock at a minimum and still be able to meet all requirements immediately.

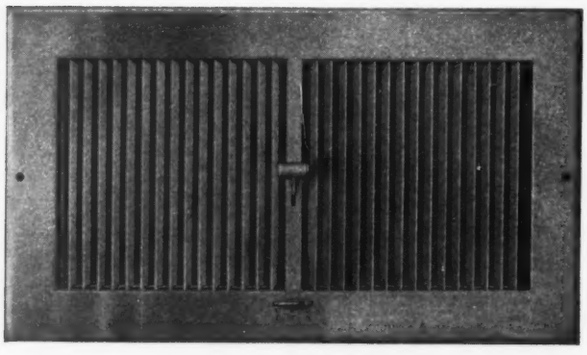
If you haven't received our announcement of the remarkable new No. 86 Register with TURNING-BLADE VALVE (face design shown below), write for it today.



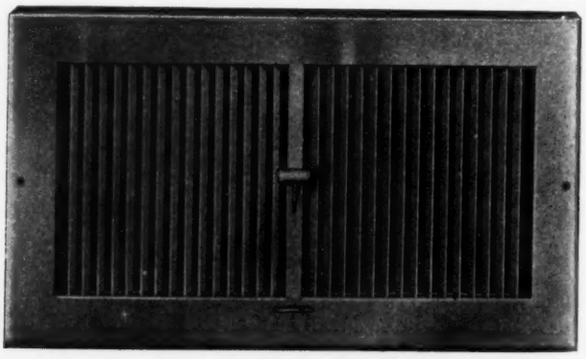
No. 3 SIDEWALL STUD FRAME
offers the ideal method of installing sidewall registers in new house work. The slight extra cost of the frame is more than offset by the many savings resulting from its use. Eliminates blocking-in — protects stackhead during construction.



No. 8 BASEBOARD STUD FRAME
Same general construction as No. 3 Frame except for greater depth, and is furnished with plaster and baseboard trim gauges. Offers all the advantages for baseboard installations that No. 3 does for sidewall installations.



No. 861—Fits Nos. 2, 3 and 5 Frames



No. 864—Fits No. 8 Frame

HART & COOLEY MANUFACTURING CO.
Warm Air Registers · Air Conditioning Grilles
Damper Regulator Sets · H&C · Dampers, Chain, Pulleys
61 W. KINZIE STREET, CHICAGO, ILLINOIS
ENGINEERING OFFICE AND FACTORY · HOLLAND · MICH.

. . . WINTER WINDS

blow more Business your Way

LONGER LIFE FOR DUCT WORK when it's made of U·S·S Copper Steel. Authoritative tests show that U·S·S Copper Steel lasts considerably longer than plain steel under alternate wet and dry conditions.

COPPER STEEL
helps you get it!

WINTER storms show up the faults of heating systems and result in more jobs for the sheet metal worker. For warm air furnaces, duct work and air-conditioning equipment, the extra life of U·S·S Copper Steel gives you a strong sales point that appeals to property owners.

The atmosphere of most cities is becoming more corrosive and the higher humidities of modern heating systems make it necessary to use steels with greater resistance to rust. With U·S·S Copper Steel, you get much longer life. You can assure a long-lasting installation when you use this superior metal.

The advantages of U·S·S Galvanized Copper Steel have made it widely used for roofing, siding, gutters, downspouts and steel buildings such as factories, farm buildings, garages, filling stations, airplane hangars.

We'll be glad to tell you more about galvanized and terne plate U·S·S Copper Steel and how it can be used. Just call our local distributor or write to one of the companies below.

U·S·S COPPER STEEL SHEETS

CARNEGIE-ILLINOIS STEEL CORPORATION, *Pittsburgh and Chicago*
COLUMBIA STEEL COMPANY, *San Francisco*
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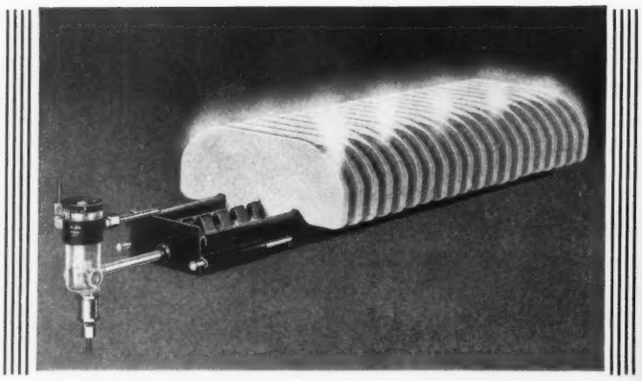
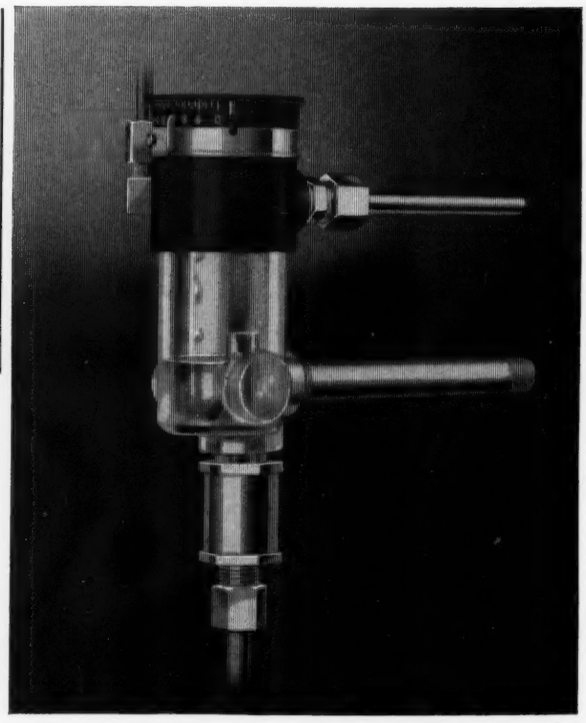
Scully Steel Products Company, Chicago, *Warehouse Distributors* · United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL



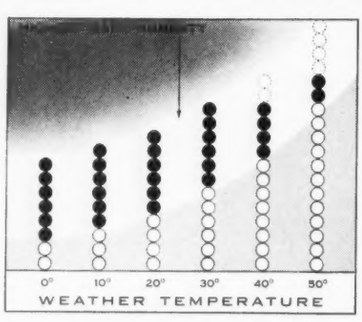


MONMOUTH *ANNOUNCES* HUMIGRAD *Control*

Monmouth's famous Automatic June Humidifying System is now available with the new Humigrad control.

This precision-built instrument automatically maintains constant water feed rate and graduates the humidity to exactly fit outside weather temperature as pictured in the chart shown below.

The operation of the Humigrad is simple. The water, after passing through a filter and governor, enters through the upper tube. The position of the calibrated dial wheel controls the rate of flow. The numbers on the wheel indicate the number of gallons of water passing through the system every 24 hours.

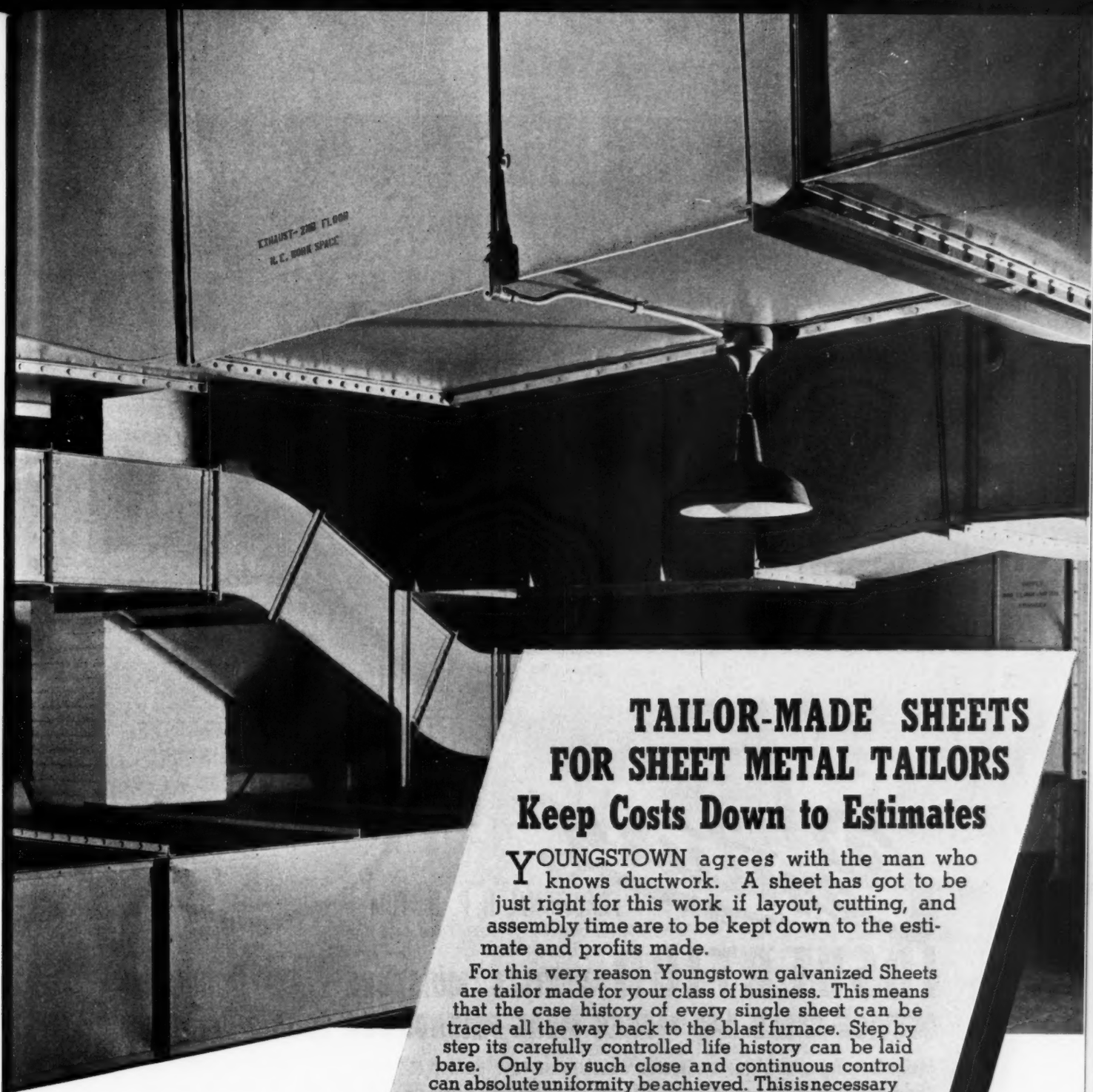


The drip feed and water level in the pan can be plainly seen in the sealed transparent cup. The owner simply sets the dial to feed at a rate suitable for *average* weather. This results in Humigrad automatically maintaining proper humidity for *all* weather.

Complete information and prices will be gladly sent on request.

MONMOUTH PRODUCTS CO.
General Offices and Factory
1933 E. 61st St.
CLEVELAND, OHIO

AUTOMATIC JUNE
GRADUATED HUMIDITY CONTROL



TAILOR-MADE SHEETS FOR SHEET METAL TAILORS

Keep Costs Down to Estimates

YOUNGSTOWN agrees with the man who knows ductwork. A sheet has got to be just right for this work if layout, cutting, and assembly time are to be kept down to the estimate and profits made.

For this very reason Youngstown galvanized Sheets are tailor made for your class of business. This means that the case history of every single sheet can be traced all the way back to the blast furnace. Step by step its carefully controlled life history can be laid bare. Only by such close and continuous control can absolute uniformity be achieved. This is necessary because there are so many different kinds of steel, and only one is right for you. For this reason Youngstown considers Galvanized Sheets a specialty and has always made them that way. When you buy Youngstown's Galvanized Sheets, you get a sheet that is uniformly ductile and lock seams or radius work can be edged evenly. The finished job bears that stamp of first class workmanship that architects demand and owners judge you by.

Buy Youngstown Galvanized Sheets to back up your workmen, to make profits and beat the estimate. Our years of experience in your business are worth money to you.

GALVANIZED TRADE MARK YOUNGSTOWN SHEETS

Sheets - Plates - Pipe and Tubular Products - Conduit - Tin Plate - Bars - Rods - Wire Nails - Unions - Tie Plates and Spikes.

10-5A

THE YOUNGSTOWN SHEET AND TUBE COMPANY

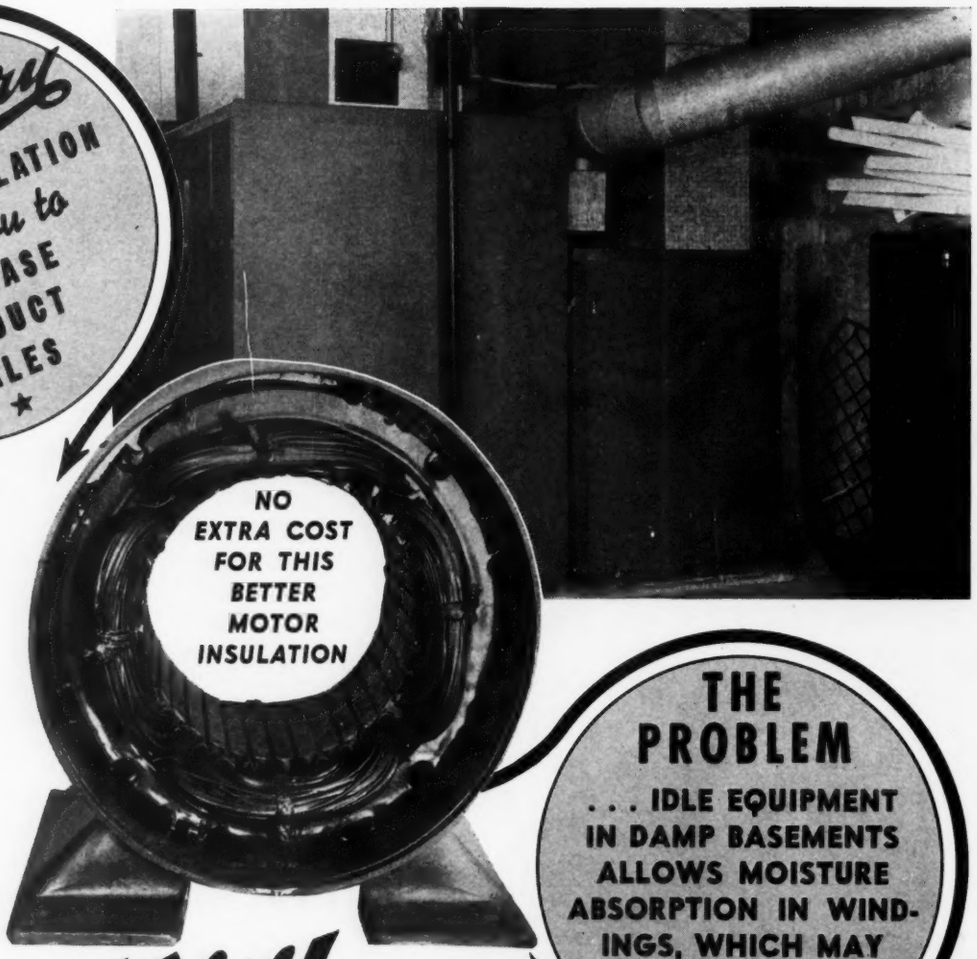
Manufacturers of Carbon and Alloy Steels

General Offices - YOUNGSTOWN, OHIO

YOUNGSTOWN

Century

MOTOR INSULATION *helps you to* INCREASE PRODUCT SALES ★



THE PROBLEM

. . . IDLE EQUIPMENT IN DAMP BASEMENTS ALLOWS MOISTURE ABSORPTION IN WINDINGS, WHICH MAY BREAK DOWN ★

Century FRACTIONAL H. P. MOTOR

INSULATION RESISTS MOISTURE • • • REDUCES SERVICE CALLS AND MAKES MORE FRIENDS FOR YOUR PRODUCTS

Here's why—The slot insulation consists of four parts: (1) The insulation on the wire. (2) A layer of varnished cambric. (3) A sheet of fibre board for mechanical protection between the varnished cambric and the laminations. (4) Clingto, an insulation varnish to saturate and cover the finished winding (baked after it is applied). The varnished cambric used in the slot lining has high dielectric strength — Clean, although previously submerged in water, it will stand not less than 1000 volts.

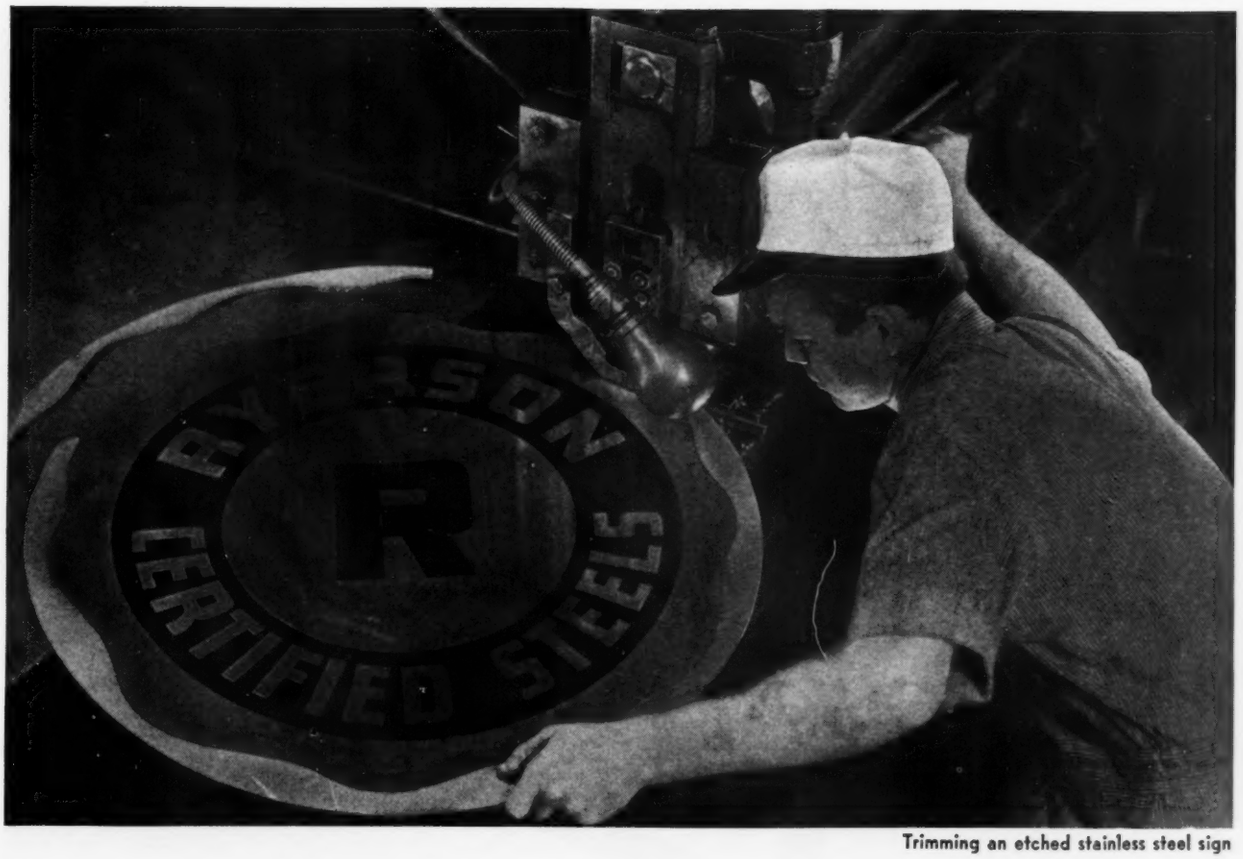
There are 31 Century Branch Offices and 125 Service set-ups where you can obtain important additional information on Century Insulation and Century Motor performance. Ask a Century representative today.

CENTURY ELECTRIC COMPANY
1806 Pine Street • • • St. Louis, Mo.
Offices and Stock Points in Principal Cities

Atlanta • Baltimore • Boston • Buffalo • Chicago • Charlotte • Cincinnati • Cleveland • Dallas
Denver • Davenport • Detroit • Houston • Indianapolis • Kalamazoo • Kansas City • Los
Angeles • Milwaukee • Minneapolis • New Orleans • New York • Omaha • Philadelphia
Pittsburgh • Rochester • Salt Lake City • San Francisco • Spokane • Seattle • Tulsa

Century MOTORS

ONE OF THE LARGEST EXCLUSIVE MOTOR MANUFACTURERS IN THE WORLD



Trimming an etched stainless steel sign

Easy Workability Assured

RYERSON Certified Steel Sheets represent the highest quality obtainable. All the different kinds are carefully tested to see that they have the qualities most desired for their particular purpose. They are carefully checked for finish, flatness, gauge and size accuracy.

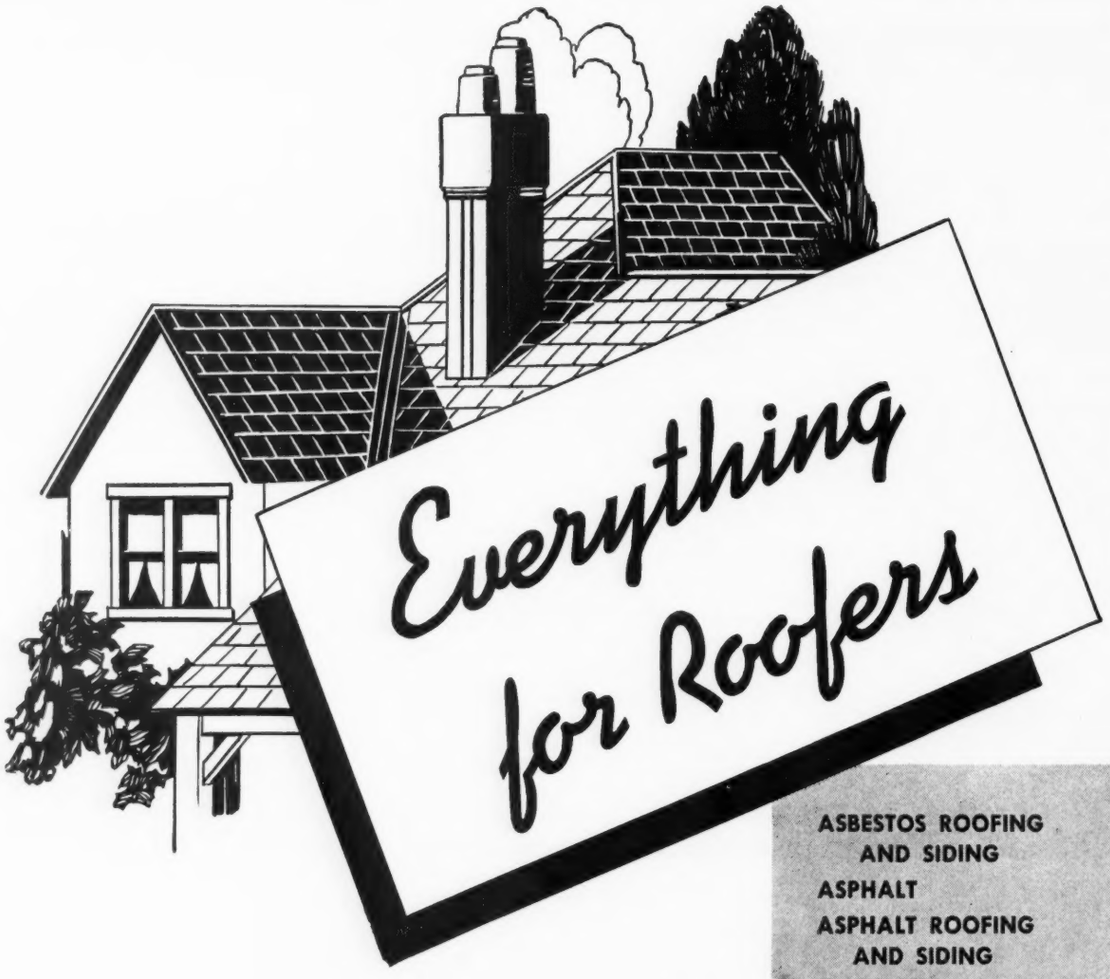
Prime quality, workable sheets are assured. Ryerson Certified Steels also include Bands, Channels, Angles and all other steel products for the sheet metal worker. You can save time and money by concentrating your purchases. Let one order to Ryerson cover all of your steel requirements.

Joseph T. Ryerson & Son, Inc. Plants at: Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City

RYERSON *Certified* STEELS

RYERSON SHEETS INCLUDE:

Allegheny Stainless	Galvanized	Stretcher Levelled
Blue Annealed	Panel and Sign	Uniform Blue
Copper Alloy	Galvannealed	Vitreous Enameling
Corrugated	Heavy Hot Rolled	Wellsville Polished
Deep Drawing	Long Terne	and Many Others



Most sheet metal men in the large territory we serve know that they can obtain anything in the line of sheet metal from OSBORN. That is only natural because we've been serving them so long. Not all of them know, however, that this same complete and dependable service is available for all types of roofing.

The wide-spread interest in housing and the low interest rate on money are combining to make this a good roofing year. Whether you confine yourself to repairs, new homes, large commercial work or do all three, you will find that OSBORN carries all of the materials, tools and equipment you use. If you are not already going after some of this business, give it some thought. You will find your OSBORN salesman ready to help you in every way possible.

- ASBESTOS ROOFING AND SIDING
- ASPHALT
- ASPHALT ROOFING AND SIDING
- CANVAS
- CAULKING COMPOUNDS
- CEMENT, ROOFING
- COPPER ROOFING
- FELTS
- FLASHING
- GALVANIZED ROOFING
- INSELBRIC SIDING
- INSULATING PAPER
- NAILS
- PAINT
- PAINT OILS
- PITCH
- ROLL ROOFING
- ROOFING CLIPS
- ALL TYPES OF TOOLS, EQUIPMENT AND SUPPLIES

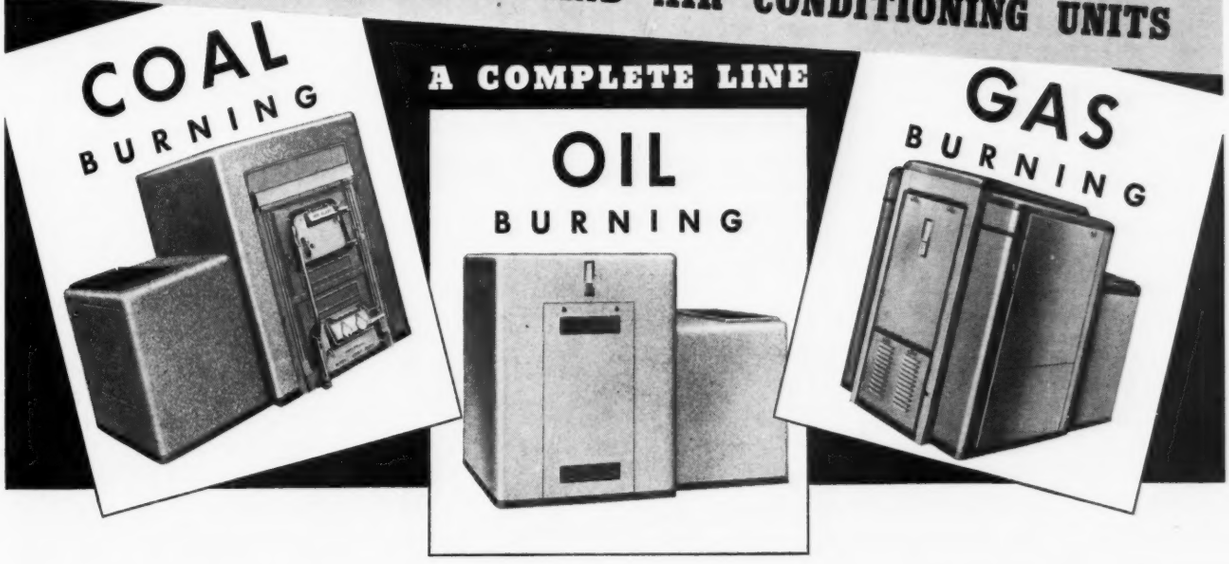
THE J. M. & L. A.
OSBORN Co
Manufacturers—Distributors
BUFFALO · CLEVELAND · DETROIT

"A DEPENDABLE SOURCE OF SUPPLY FOR 80 YEARS"

IN YOUR TOWN · · YOU WILL BE THE LEADER WHEN YOU SELL

SUNBEAM

WARM AIR FURNACES AND AIR CONDITIONING UNITS



Besides the complete SUNBEAM Line of Warm Air Furnaces and Air Conditioning Units... for OIL burning, COAL burning and GAS burning ...you will have PRICES THAT MEET COMPETITIVE BIDDING AND GIVE YOU A GREATER PROFIT MARGIN.

The entire field of residential heating and air conditioning is wide open to you . . . whatever the type of house, new or old, large or small... whether gravity furnace heating or air conditioning is to be installed.

And SUNBEAM helps you... IN YOUR TOWN... with a program of advertising, with many types of dealer helps and an easy time payment plan.

Sunbeam's National Leadership, evidenced by the fact that MORE HEATING CONTRACTORS SELL SUNBEAM THAN ANY OTHER MAKE assures leadership for you in your locality. Write today for complete information. Use the coupon.

AMERICAN RADIATOR & Standard Sanitary
CORPORATION
FOX FURNACE DIVISION
ELYRIA, OHIO

American Radiator & Standard Sanitary Corporation
Fox Furnace Division, Elyria, Ohio.

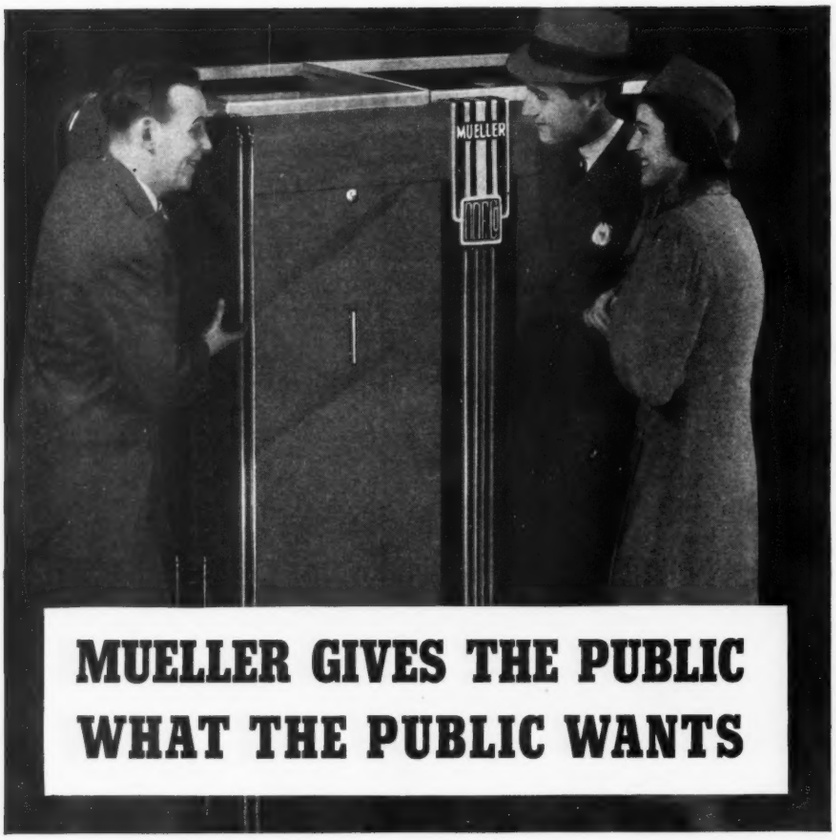
Please send me complete details of your Sunbeam Selling and Advertising Plans.

Name_____

Address_____

City_____ State_____

AA-3-39



MUELLER GIVES THE PUBLIC WHAT THE PUBLIC WANTS

DEALERS who know Mueller have supreme confidence in the service which Mueller heating equipment delivers to users.

•

MUELLER ENGINEERS experiment with a purpose. They first know what the homeowning public wants. Then they work out ideas for producing the kind of heating equipment that will meet those wants.

•

PROGRESS COMES ABOUT when engineering makes the "impossible" not only possible, but also inexpensive, efficient and foolproof.

•

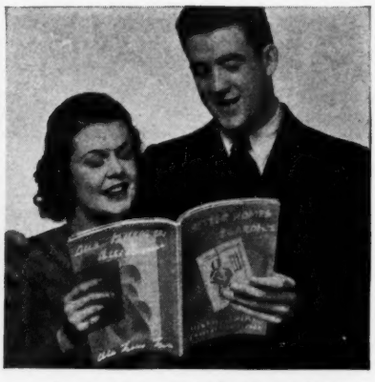
TODAY the public wants automatic heat and air conditioning. Mueller is ready with a full line of furnaces, fan and filter units and air conditioning equipment.

H. P. MUELLER, *President*

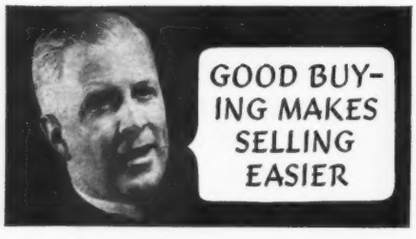
1 Gas Heat. Buyers thrill to the beauty and efficiency of Mueller Climatrol Air Conditioning Furnace. This one compact unit warms, filters, humidifies and circulates the air within the home at a cost no greater than for heat alone. Heat Speeder, Mueller's exclusive steel Gas Furnace Section, transfers heat six to eight times faster than old style units. Mueller also offers Climatrol, Jr. and Flor-Aire for small homes.

2 Oil. Mueller's streamlined Series "O" complete Air Conditioning Oil Furnace of patented design, sets new standards of efficiency. Secures complete combustion; delivers more heat from fuel; cuts cost of operation. Learn about this great innovation.

3 Coal. Mueller engineering has set the pattern for efficiency in coal-fired equipment for hand or stoker firing. Newly developed model especially for use with stoker eliminates fly ash accumulation, simplifies clinker removal. Mueller Fan and Filter units can be added to existing furnaces.



4 Consistent National Advertising in magazines now carries news about Mueller achievements in heating equipment to more than 3,000,000 homeowners interested in building and modernizing their homes.



Write today for Mueller's complete, condensed catalog and dealer plan.

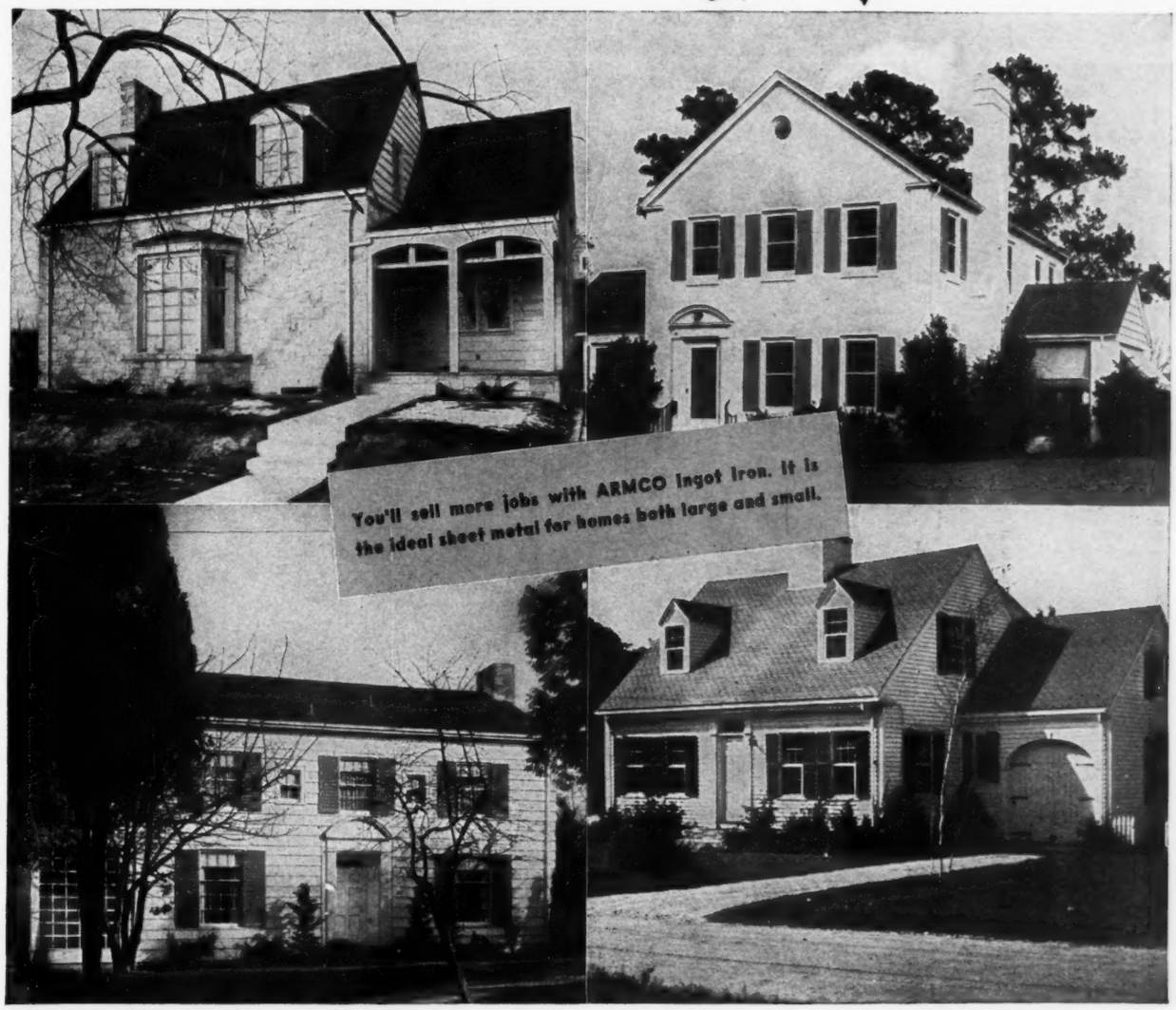
•

L. J. MUELLER FURNACE CO.
2010 W. Oklahoma Ave.
Milwaukee, Wis.

MUELLER (m) MILWAUKEE
HEATING AND AIR CONDITIONING
COAL • OIL • GAS

TO SAVE YOUR SALES!

Use the Sheet Metal *"Everybody Knows"*



• Competition for sheet metal jobs can be mighty tough these days. Yet somebody gets the order, and it may as well be you. One good way to clinch the sale and assure satisfaction is to tell your prospect that you use ARMCO Ingot Iron.

The great merchandising value of this durable sheet metal is the result of continual national advertising since 1914. Many of your prospects have read about ARMCO Ingot Iron in national magazines, heard about it over the radio, and experienced its thrifty durability in actual use. They will accept your recommendation with full confidence. Think of the advantages this gives you in quicker sales and added profits.

Use ARMCO Ingot Iron wherever you want an economical sheet that you can form beautifully into the most difficult job. Order it plain galvanized or with the special galvanized PAINTGRIP* finish that assures immediate painting and long paint life. The nearby Armco distributor will quickly supply your needs, and he will also provide valuable services to help you get more business. Call him on that next sheet metal order. The American Rolling Mill Co., 231 Curtis St., Middletown, Ohio.

(BONDERIZED)

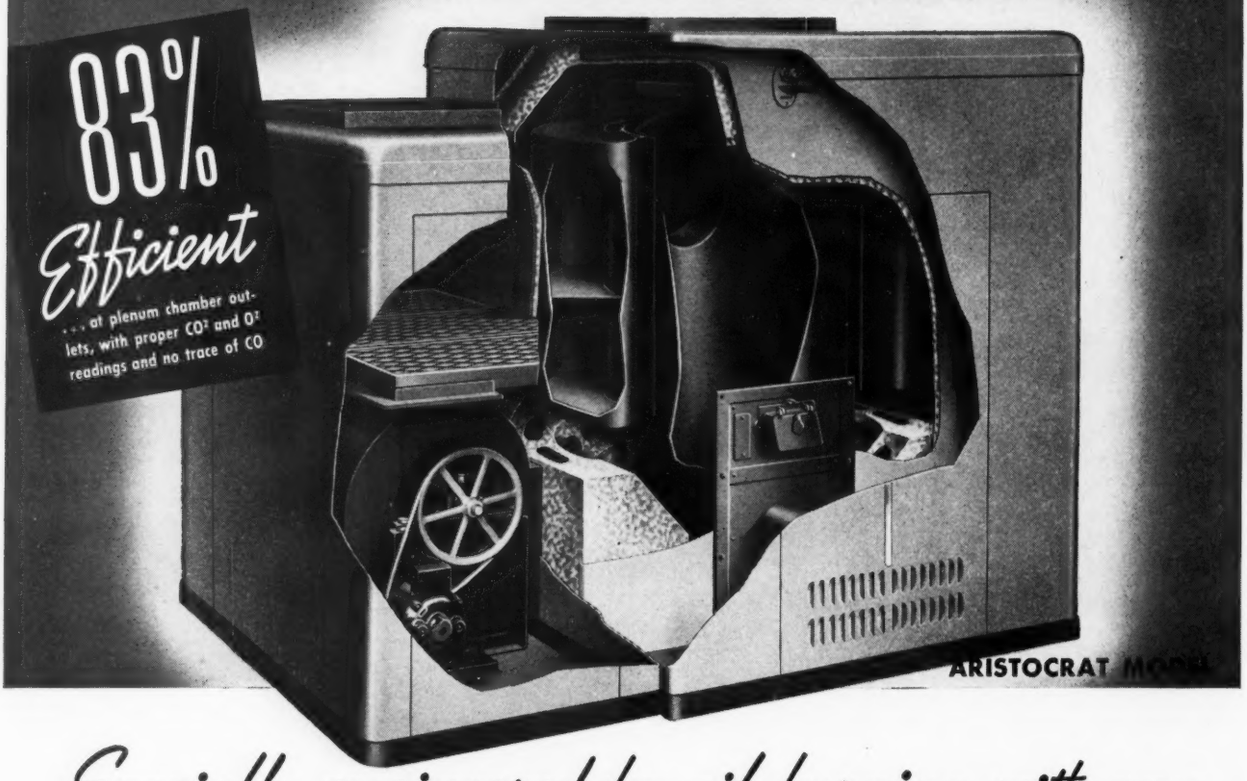
ARMCO INGOT IRON

MONCRIEF *Oil Fire*

WINTER AIR CONDITIONERS

83% *Efficient*

. . . at plenum chamber outlets, with proper CO^2 and O^2 readings and no trace of CO



Specially engineered for oil burning with any

STANDARD TYPE OIL BURNER

THIS newest Moncrief Oil-Fire Air Conditioner, combined with the oil burner you sell, gives you a packaged unit of unequalled beauty and efficiency . . . makes oil heating more economical and convenient than ever before.

Only in this Moncrief Aristocrat will you find so many important features, such as the patented wind-box which correctly distributes air over heating surfaces; external and internal radiator baffles to effect greater heat transfer; completely sealed dust-tight cabinet, double-wall construction for effective insulating of cabinet against heat losses, and many other important features.

For the complete facts on Moncrief Oil-Fire Winter Air Conditioners, write today for two new books now ready.

THE HENRY FURNACE & FOUNDRY CO.

3473 East 49th Street **Cleveland, Ohio**

THE "SPECIAL" FOR SMALL HOMES

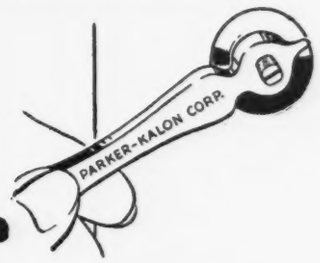
Specially designed, specially priced for small homes. Low first cost combined with low fuel costs makes this a most economical unit. Can be fired with any standard type oil burner. Demonstrates amazing heating capacity and efficiency. Ask for descriptive literature.

PARKER-KALON *Jiffy* REGULATOR SET

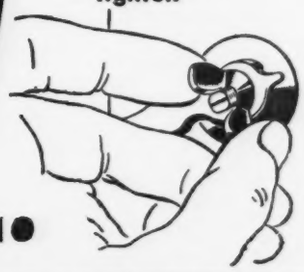
The new, low-cost, efficient Damper Regulating Unit that you can

INSTALL IN A JIFFY!

1. Slip **FRAME** and **LEVER** on threaded Bearing



2. Turn on **WING NUT** —tighten



IN A JIFFY—aptly describes how quickly and easily this newest and simplest of all damper regulators can be installed.

Low priced, and as efficient in operation as those costing considerably more, the Parker-Kalon Jiffy Regulator Set has met the demand for an inexpensive, easy-to-install, rattle-proof regulating device for domestic air conditioning and furnace installations. Put the P-K "Jiffy" on *your* jobs. You, too, will welcome the savings in time, labor and money this new, low-cost damper regulator makes possible. Parker-Kalon Corporation, 200 Varick Street, New York.

Jiffy Regulator Set installed. Note how Lever indicates position of damper in duct.

Jiffy FEATURES

SPEEDY—Installed in a jiffy
ECONOMICAL—Cost only a few cents
EFFICIENT—Positive damper control . . . no rattles
ADAPTABLE—Fits round or rectangular dampers up to 10"
DURABLE—Heavy gauge steel, zinc plated
SAFE TO HANDLE—No rough edges
HANDY COMPLETE SET—Ready to install

Illustrated; Parker-Kalon Jiffy Regulator Set No. 7

Also—IMPROVED *Dial* DAMPER REGULATOR SETS with NEW SPRING-IN BEARING

Now the famous Parker-Kalon Dial Regulator Sets (1/4" for dampers up to 10"; 3/8" for dampers up to 20") will be more popular than ever—because:

(1) New self-locking Spring-in Round-end Bearing simplifies and speeds up installation of damper.

(2) Frame redesigned to eliminate damper rattles.

(3) Locking nut with key, supplied in place of Wing Nut, for tamper-proof installations, when desired.

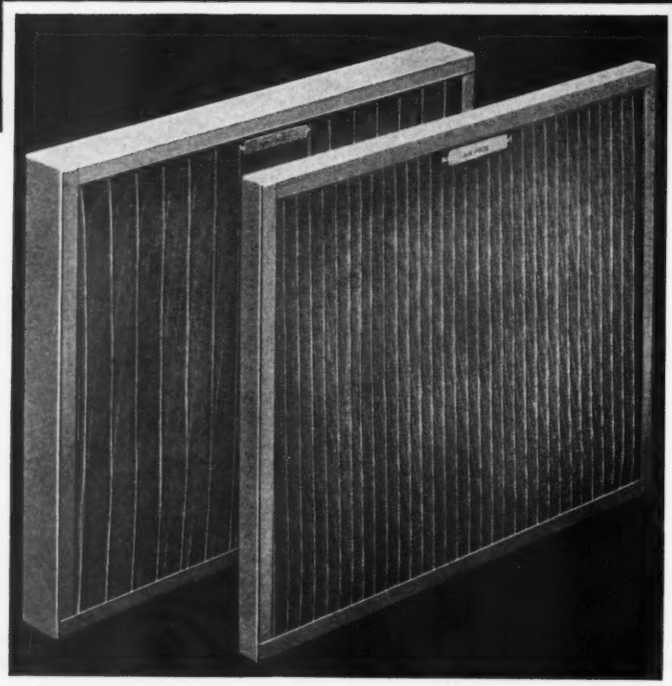
(4) Now available made of brass as well as of steel.

Products of **PARKER-KALON CORPORATION, NEW YORK**

Sold only through Recognized Distributors

FOR REAL ECONOMY

HERE'S THE AIR FILTER YOU NEED



AIR-MAZE KLEENFLO PANELS — MODELS K-2 AND K-1

AIR-MAZE Kleenflo

AIR FILTER PANELS

For Residential Air Conditioners, Furnace Blower Units and Replacements on Existing Jobs

Having a tested efficiency of 98% to 99.6% with extremely low pressure drop, AIR-MAZE KLEENFLO air filter panels completely fill the need for a dependable, fire resistant, easily cleanable air filter which makes frequent and costly replacements unnecessary. Yet their initial cost is only slightly higher than that of conventional throw-away filters.

Small wonder that AIR-MAZE KLEENFLO panels are making such strong headway in the industry both for original installations and for replacements on existing jobs.

Write today for Bulletin KCP-118 and prices.

AIR-MAZE CORPORATION
5130 Harvard Avenue **Cleveland, Ohio**

LOW COST OF UPKEEP

Time and again during their long life AIR-MAZE KLEENFLO panels may be completely cleaned easily and quickly. After each simple servicing —costing only a few cents—*they again have the performance and characteristics of new filters.* Here's a *real saving* when you compare the small expense of upkeep against frequent replacements of throwaway filters each costing a dollar or more.

HOLDS MORE DUST

The scientifically designed screen wire element with its exactly spaced baffles provides a vast dust holding capacity which is 1½ to two times greater than that of conventional filters. The result is increased efficiency, less servicing and greater economy.

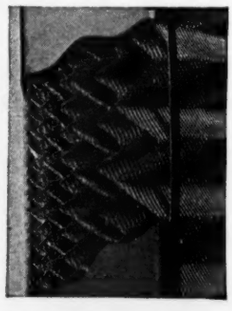
EASY TO CLEAN

KLEENFLO panels are easily and thoroughly cleaned merely by swishing in a pan of hot water or under a stream of hot water. Then they may be recharged by spraying with any inexpensive oil of SAE 20 viscosity. An ordinary insect spray gun will answer the purpose. Or if desired, the panel may be immersed in oil and then drained thoroughly. Because of the scientific "open" construction of the KLEENFLO element and the extra large area provided, *no clogging can occur.*

TROUBLE-FREE PERFORMANCE

Outstanding features of AIR-MAZE KLEENFLO panels which insure *highest efficiency* and *trouble-free performance* include the following:
Free flow of air; long operating service between cleaning intervals; all-metal construction which gives rigidity and makes the KLEENFLO panel fire resistant and odorless; accurate fit which permits KLEENFLO panels to slip readily into space previously occupied by standard size conventional filters; easy cleaning; vast dust holding capacity; long life.

HERE'S THE REASON FOR ITS AMAZING EFFICIENCY



This cutaway view of the unique filter element illustrates the precise construction which characterizes the scientific AIR-MAZE design. Arranged to create graduated and progressive density these exactly spaced crimped galvanized wire screens perfectly embody the baffle-impingement principle of air filtration.

AIR-MAZE

Now a Complete Line, Competitively Priced . . .

DELCO-FRIGIDAIRE

HEATING AND AIR CONDITIONING PRODUCTS

Built and Backed by GENERAL MOTORS GM

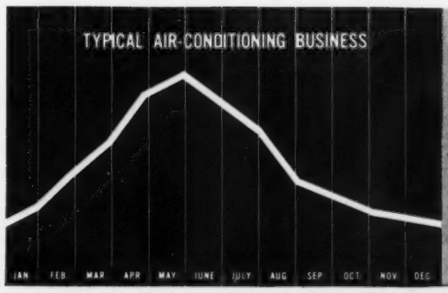
Provides the Outstanding Opportunity for a Profitable Year-'Round Business

• New and improved products! New advertising! New selling tools! Newly enlarged field organization, and the most complete line of automatic heating and air conditioning products in existence, now combine to make a Delco-Frigidaire franchise more profitable, more desirable than ever before.

Full line selling makes year-'round profits

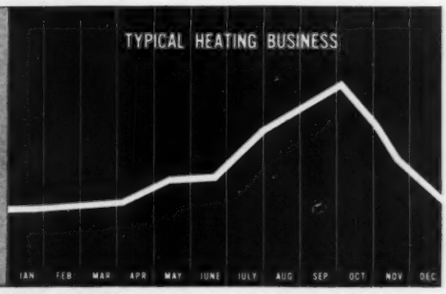
To increase your total volume of business, to guard against seasonal slumps, to provide year 'round employment for salesmen and to make more money for yourself, consider the sales advantages of the *Complete* Delco-Frigidaire Line—the line that masters competitive situations through merit of product, fairness of prices, and the well known name of General Motors.

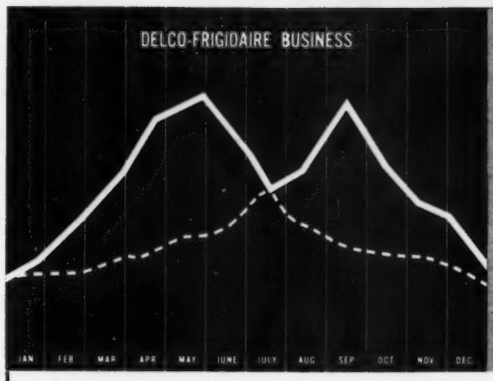
Study the above charts . . . See how the Delco-Frigidaire combination heating and air conditioning business fills out a 12 months' selling season, making it practicable for you to keep your salesmen on a year 'round basis by directing sales efforts from heating to air conditioning and back again according to season.



If you're an Air Conditioning Specialist, your business peaks in the spring.

If you're a Heating Specialist, your business peaks in the fall.





But-

If you're a Delco-Frigidaire Dealer, you have a year 'round business.

A peak business with no deep sales valleys . . . in products which form a natural, logical combination with a practically unlimited market. An unequalled opportunity for year 'round profit.

Before you make any plans for this spring, get all the facts about the complete, money-making Delco-Frigidaire line. If you are now a 100 per cent heating man, learn how easy it is to tie air conditioning into your business and profit thereby. If you are a 100 per cent air conditioning man, let us tell you how to cash in on the heating business in your territory also. Mail coupon today. You will not be obligated in any way.

DELCO-FRIGIDAIRE

DIVISION GENERAL MOTORS SALES CORPORATION

AIR CONDITIONING & HEATING PRODUCTS

Unit Air Conditioners · Portable Air Conditioners · Commercial Air Conditioning
Oil Burners, Stokers, Oil & Gas Furnaces · Oil & Gas Winter Conditioning Units

YOUR OPPORTUNITY COUPON

Mail it Today!

Delco-Frigidaire Conditioning Division
General Motors Sales Corporation
Dayton, Ohio AA-3

Please send me complete information regarding a Delco-Frigidaire dealer franchise backed by General Motors.

*Name*_____

Address _____

*City*_____ *State*_____

"That's Great! - but what do you do with regular orders?"

ALLOYS
ANGLES, HOT ROLLED and COLD ROLLED
ARCHES (CORRUGATED)
BABBITT
BANDS and HOOPS
BARS, HOT ROLLED
ALLOYS (HR and CF)
COLD FINISHED
ELECTRIC HIGH CARBON STEEL
REINFORCING
BEAMS and C. B. SECTIONS
BEEF RAIL
BOLTS, NUTS, WASHERS, ALL KINDS
BORING and TURNING BARS and GRINDERS
BRACES, BOILER
CHAIN, ALL KINDS
CHANNELS
CHISELS
CHUCKS, STAYBOLT
CLAMPS, BOILERMAKERS
CLIPS, PATTERSON
CLEANERS, FLUE
CONDUCTOR PIPE
COPPER and BRASS
COUPLINGS, HOSE
CRAYONS, SOAPSTONE
CUTTERS
DARDELET RIVET and MACHINE BOLTS
DRILL RODS
EAVE TROUGH and FITTINGS
EXPANDERS, FLUE
FERRULES, COPPER
FLANGES, BOILER and TANK
FLOOR PLATES
GALVANIZED SHEETS, BARS, BANDS, ETC.
HANDLES, HAMMER
HEADS, TANK and FLANGE
HOISTS, HAND and POWER
IRON, STAYBOLT
LUGS, BOILER, TANK and SILO
MACHINERY, HAND and POWER
MANHEAD PLATES and FITTINGS
NAILS
PACKING
PAINT STICKS
PLATE STEEL, STANDARD QUALITIES
ABRASION RESISTING
COR-TEN and MAN-TEN
PLUGS, FLUE
RAILS and FITTINGS
REAMERS
SHAFTING
SHEETS
ABRASION RESISTING
COR-TEN and MAN-TEN
HOT ROLLED and UNIFORM BLUE
WELLSVILLE POLISHED
COLD ROLLED
STAINLESS STEEL
GALVANIZED and GALVANNEALED
LONG TERNE
CORRUGATED
U-S-S COPPER STEEL
SPRING STEEL BARS and SHEETS
STAINLESS STEEL
STRIP STEEL, CR and HR
TEES
TIRE, ROUND EDGE
TOOLS, HAND and POWER for BOILER and IRON WORK
TROLLEYS
TUBES, BOILER
TURNBUCKLES
VALVES, BLOW-OFF
WELDING ROD and WELDERS
ZEES

USS Scully Service

"A salesman from the Scully Twin Cities Warehouse was calling on a customer when his shop foreman came in and wanted 25 angles within an hour. The Purchasing Agent was peeved. But our salesman said we could make delivery. A phone call resulted in delivery of the material in 25 minutes—in fact before our salesman had left."

"OF course," said the Purchasing Agent, "you naturally wanted to impress me. But, what kind of delivery do you make on regular orders?"

Our representative was glad this question was asked. For each of the eight Scully Warehouses operates on the principle that customers always want their materials prepared and shipped at once. Promptness is the rule on all orders big or little. And when there's an unusual emergency Scully knows that unusual service is needed, so we act accordingly.

That's why thousands of customers all over the country depend upon Scully Service when they want steel, steel products, copper or brass.

Phone, write, or wire the warehouse nearest you. See for yourself why friendly Scully Service has made and held so many friends. And ask for our handy complete Stock List and Reference Book—it's free.

SCULLY STEEL PRODUCTS COMPANY

Distributors of Steel, Steel Products, Copper and Brass

CHICAGO · NEWARK, N. J. · ST. LOUIS · BOSTON · ST. PAUL—MINNEAPOLIS
CLEVELAND · PITTSBURGH · BALTIMORE

UNITED STATES STEEL

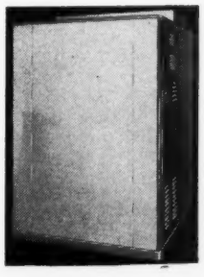
"Gentlemen, This is Our Problem"

"We're up against a new set of conditions in '39, so we might just as well scrap our old notions and start fresh.

"Here are the facts. Experts tell us to anticipate a 30% increase in new residential construction and a good increase in modernization over '38. We'll go places if we can deliver the goods.

"We'll find Air Conditioning Heating in practically all the 'specs' and again its up to us to deliver the goods. Makeshifts are out. Engineered equipment and installations are the order of the day.

"We can no longer '*plug*' for any one fuel, only a complete heating service, with a complete line, will keep this business operating at top speed. Its up to us to make the correct decision—and now's the time."



...and the Solution

AFCO TRADE NAMES REGISTERED THERMO

Change to "AFCO"—these are the three important reasons to consider.

1. *Experience and Reputation.* **Founded in 1900—"AFCO" is one of the outstanding Pioneers and Leaders in the Air Conditioning Heating Business. "AFCO" understands your sales and installation problems—helps you to solve them.**

2. *Balanced Line of Equipment.* **"AFCO" has never deviated from the "Tested in Service" formula, which makes every "AFCO" Furnace and Complete Unit a demonstrated success before it is placed on the market. You buy and sell with confidence.**

3. *Balanced Organization.* **Competent Engineering Staff—modern production methods—adequate service facilities—every factor in your favor for meeting competitive selling. Make one decision now. Let us give you the details without obligation. Merely attach the coupon to your letterhead and mail.**

Chart Your Profits With "AFCO"

Send for your copy of this 25 in. x 38 in. wall chart attractively illustrating, in color, the complete line of "AFCO" Equipment.

There are still many territories available for Wholesale Distributors and Installers. Investigate the exclusive advantages of the "AFCO" Franchise.

Use the handy coupon.

AMERICAN FURNACE CO.

2719-31 DELMAR BLVD.

ST. LOUIS, MO.

Manufacturers of Quality Heating Equipment Since 1900.

AMERICAN FURNACE CO. AIR COND. DIV. A.A.M.
2719-31 DELMAR BLVD., ST. LOUIS, MO.

☐ Send Wall Chart

☐ Send Bulletins and complete price information, without obligation.

Name .....

Address .....

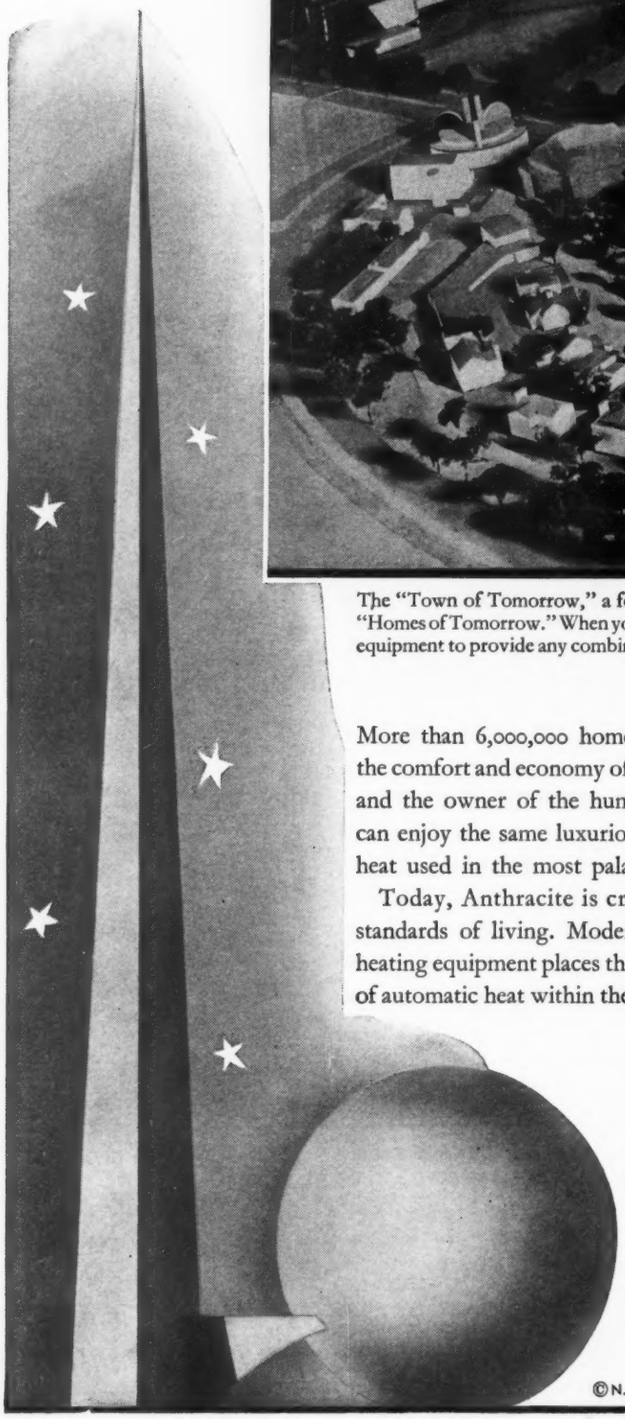
City .....*State*.....

Signed .....

ANTHRACITE—

the fuel of tomorrow for the home of tomorrow

The "Town of Tomorrow," a feature of the New York World's Fair 1939, will be composed of typical "Homes of Tomorrow." When you see this model town, remember that there is a choice of Anthracite heating equipment to provide any combination of convenience and economy to fit the budget for any type of home.



More than 6,000,000 homes now enjoy the comfort and economy of Anthracite—and the owner of the humblest cottage can enjoy the same luxurious Anthracite heat used in the most palatial mansion.

Today, Anthracite is creating better standards of living. Modern Anthracite heating equipment places the convenience of automatic heat within the reach of millions who can not afford the costly fuels of other forms of automatic heat. Growth in the use of Anthracite for home heating is making America a cleaner, more healthful and better place in which to live. Pennsylvania Anthracite is truly the fuel for "The Homes of Tomorrow."

ANTHRACITE INDUSTRIES, Inc.,
Chrysler Building, New York, N. Y.

At the great World's Fair at New York in 1939
be sure to see the striking and educational
ANTHRACITE EXHIBIT at the Home Building Center.

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Save with Pennsylvania ANTHRACITE
(HARD COAL)
THE ONLY 7 STAR FUEL

HAVE YOU CHECKED THE NEW *Peerless* DIRECT-DRIVE BLOWER?

- Automatic Speed Control
- Inexpensive controls required
- Increased Heating efficiency
- Silent Operation
- Attractive New Cabinets
- Low Cost
- Dependability

THE most modern, efficient and effective blower installation for warm air heating is the *automatic two-speed* installation. Two decidedly different types of automatic two speed blower units are available—the direct drive and the belt drive. Peerless manufactures both but strongly recommends the direct drive.

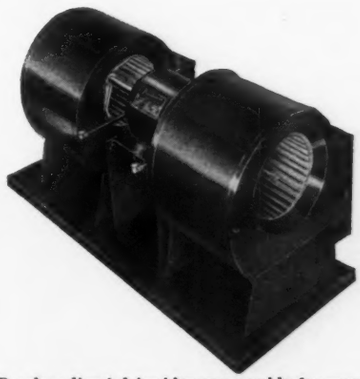
A Peerless direct-drive blower unit has the blower wheels mounted directly on the motor shaft. The motor has three speed taps two of which may be selected for automatic "High-Low" operation by simple bonnet control. Du Luxe models have eight available speeds to choose from.

Peerless direct-drive units are not a luxury. They now compare in price with two-speed belted blowers and in cases are even lower.

Whether you favor direct-drive or belt-drive write for the new Peerless bulletins and prices covering a wide range of sizes and types.

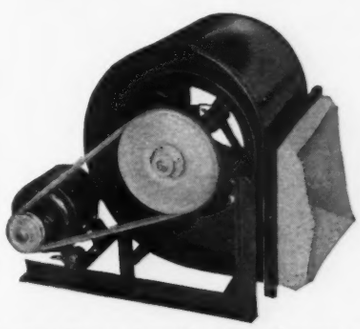
THE PEERLESS ELECTRIC CO.

WARREN, OHIO



Peerless direct-drive blower assembly for warm air furnaces or air conditioning units.

Peerless package units—direct-drive or belt-drive—with new beautifully finished cabinets.



Peerless Blower Assembly with either top or rear mounted motor.

The Peerless Electric Co.
Warren, Ohio

Please send me the new Peerless blower catalogs and price list.

Name .....

Address .....

City and State.....

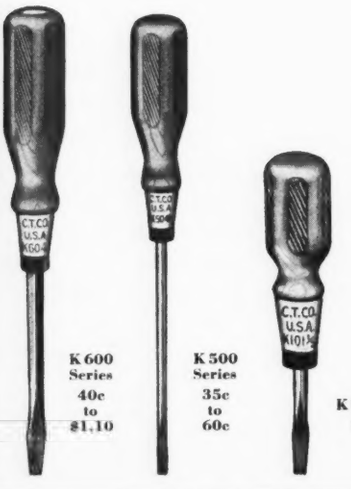
BIG INDUSTRY PREFERS THIS BETTER SCREWDRIVER

● Many of America's leading industrial plants have standardized on CRESCENT Screwdrivers. In their own laboratories and factories, by their own exhaustive tests, they have stamped CRESCENT SCREWDRIVERS as better built . . better balanced . . longer lived!

Compare Crescent construction.

Blades are drop-forged from alloy steel; shanks spring-tempered to withstand abuse; points properly hardened for long service. Ferrules, turned from a solid bar of steel, are forced onto blades under heavy pressure. Handles of seasoned, straight-grained, hard maple are driven firmly into ferrules. Flutings on blades grip both ferrule and handle. Points are clean-cut and sharp.

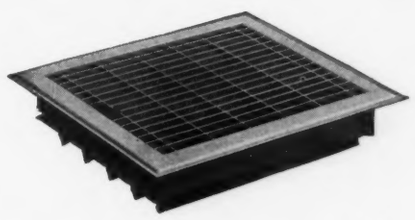
Sell the Screwdriver which big industry approves. There are CRESCENTS for every type of work. Blade lengths up to 12 inches . . every tool fully guaranteed.

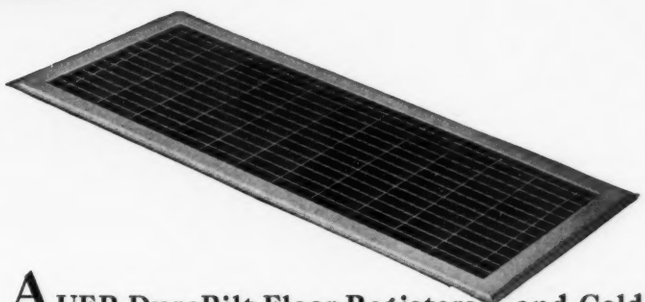


CRESCENT TOOL CO.
Jamestown, N. Y.

CRESCENT and Smith & Hemenway TOOLS

strength and beauty are combined in DURA-BILT FLOOR REGISTERS AND INTAKES... *by* AUER



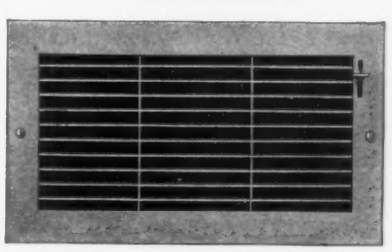


"DuraBilt" means "built for durability."

AUER DuraBilt Floor Registers and Cold Air Faces are well proportioned, smartly modern in design. Effective resistance to wear and tear is assured by their staunch construction. They are assembled from steel cross-bars, each cross joint locked and mortised, each end joint interlocked to substantial welded and reinforced frame. High percentage of free air opening in either standard mesh or narrow mesh.

Dura-Flo Registers and Grilles have blades adjustable for any desired air flow, with approximately 80% open area. Reinforced construction keeps faces level and bars in alignment.

Dura-Flo Register, also made with horizontal adjustable bars.



Write for Auer Catalog 39, listing and illustrating complete line of registers, intakes and grilles for all gravity heating and air conditioning purposes.

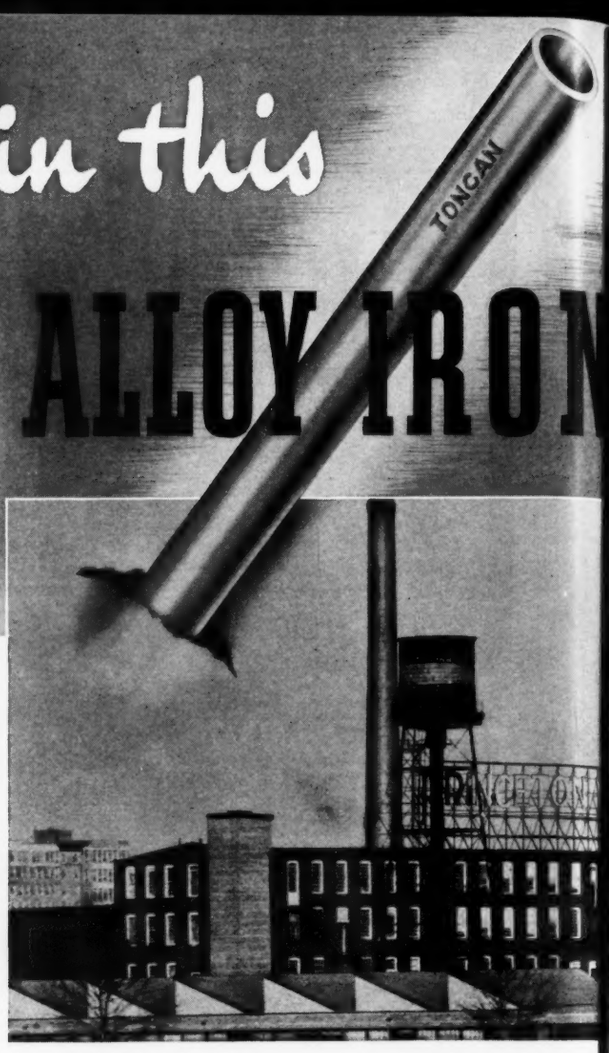
Your Jobber will gladly show the current Auer line.

THE AUER REGISTER COMPANY, 3608 PAYNE AVENUE, CLEVELAND, OHIO

AUER DISTINCTIVE REGISTERS & GRILLES For Air Conditioning *and* Gravity

There's "gold" in this ALLOY IRON

There's a growing market for sheet metal in the active air-conditioning field. Here the rust-resistance of Toncan Iron has proved a potent sales argument.



Because Toncan Iron lasted twice as long as another material in conductor pipe, this textile mill used a large quantity for dye-room equipment.

Toncan Iron proved so satisfactory in kitchen equipment that this restaurant owner specified it for a huge 140-ft. ventilating stack.

● The most tricky chemical analysis would seem to give the lie to the statement that there's "gold" in *Toncan Iron—but it's there for you to take out in bigger and better extra sales with a good profit margin.

Because Toncan Copper Molybdenum Iron possesses the highest rust-resistance of ferrous metals in its price class, customers return to the contractor who endorses it and brings its money-saving qualities to their attention. Its lower cost per year in service sells it again and again to thrifty users who appreciate how expensive premature failure caused by rust can be.

No need to tell you where sheet metal is contractor-sold, but some time when competition seems to have a strangle hold on desirable business, use Toncan Iron to lift your quotation out of the ordinary run of price selling.

The short stories with the illustrations show how Toncan Iron has helped other contractors find "gold." Make it your "silent partner." Descriptive literature, sent on request, will prove it to be a good business move.

*Reg. U. S. Pat. Off.

TONCAN IRON

An alloy of refined open-hearth iron, copper and molybdenum
—that grows old slowly

REG. U. S. PAT. OFF.
REPUBLIC STEEL CORPORATION
GENERAL OFFICES: CLEVELAND, OHIO

UNION DRAWN STEEL DIVISION • STEEL AND TUBES, I
NILES STEEL PRODUCTS DIVISION • TRUSCON STEEL
BERGER MANUFACTURING DIVISION

AMERICAN ARTISAN

Volume 108 Number 3

Don't Let F. H. A. Lapse

MOST of the 1938 year-end surveys and forecasts emphasized that 1938 was a good year for the construction industry. The residential building outlook now, as always, seems to attract particular significance in the eyes of the forecasters, since this class of building has the largest potential volume (in numbers of units) and this volume influences a very wide range of material production and sales activities.

Beginning in February, 1938, weekly figures for small home construction mortgages selected for appraisal by F.H.A. began to run ahead of corresponding weeks of 1937. The spread between 1938 and 1937 figures continued right through the year and has carried into 1939. At the end of 1938 the increase was 8 to 9 per cent above 1937.

As readers of this publication well know, F.H.A. over the country has been the biggest single influence in increased residential building. That F.H.A. will continue to be the biggest factor for increased construction in 1939, seems highly probable. Some people still profess to feel that F.H.A. is and will be an artificial stimulant, but experience seems to show that there has been little artificial about the acceptance of the F.H.A. financing method for remodeling, repair, or new house construction under either Title 1 or Title 2. As a matter of fact, most home builders consider the single, amortizing mortgage as the best thing which has happened to home building in the last decade.

As most contractors understand, when F.H.A. was reinstated last year, the act was extended for only one year or until June, 1939. Unless the congress takes some action, F.H.A. will cease operations in June of this year. That such action should come to pass will be very regrettable in view of the important role F.H.A. has and is playing in home construction.

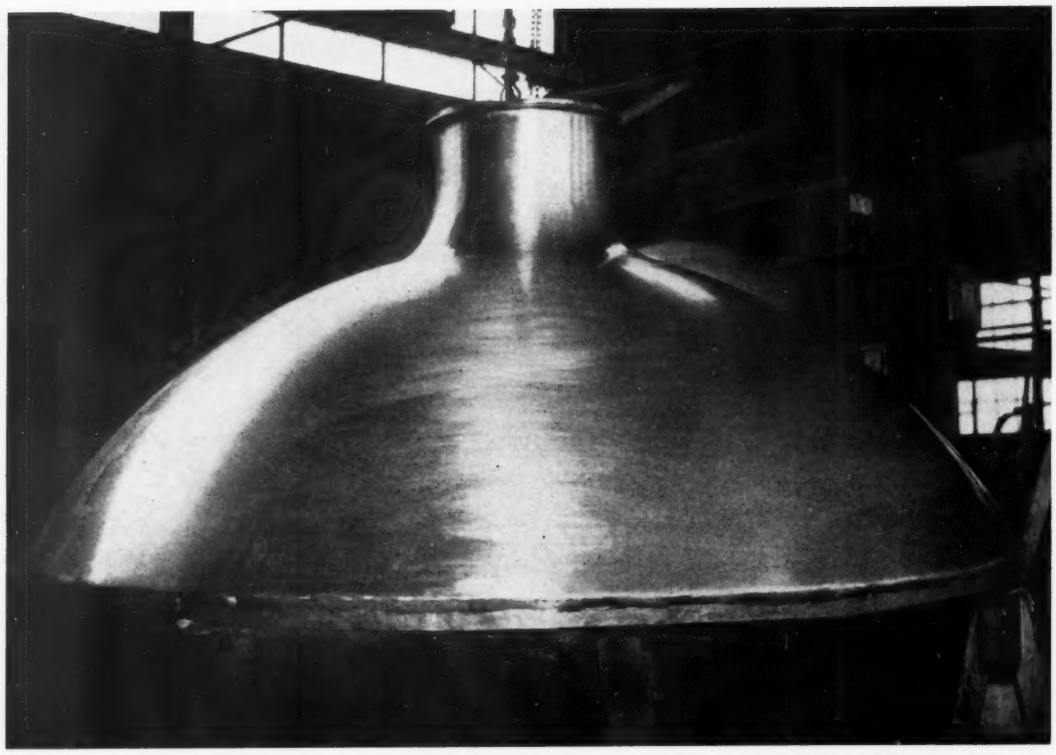
So far as we can tell from news coming out of Washington, Title 2 covering new construction will very probably be continued, because the administration does not want any reduction in construction at this time. There is, however, some gossip that Title 1, which covers remodeling, has been under fire, some men in Washington professing to feel that remodeling has served its purpose and that the F.H.A. remodeling plan with extended repayments has become so firmly established that the plan will continue even though F.H.A. stops guaranteeing loans.

This argument is academic, it seems to us. Title 1 has not cost the government any money and so long as any kind of guarantee may sustain remodeling volume, such a guarantee ought to be continued.

Our section of the construction industry surely does not want to see any stopping or slowing down in remodeling. In many sections of the country, new house construction has reached such a state that profit seeking contractors cannot get any profit from heating systems and have turned to old house work as the only field offering a chance to make a profit. In old house work, Title 1 is most essential even if it serves only the purpose of providing the home owner with a sense of security and stability in the money borrowing field.

Therefore, if contractors installing heating equipment and systems, or sheet metal and roofing work on new houses and on old houses, feel that F.H.A. has been, is and will be an important influence in 1939 construction and sales, it behooves every contractor to make his feelings known immediately and forcefully to his congressman and senator. These gentlemen undoubtedly want to keep alive anything which business favors, particularly such things as F.H.A. which has cost the government no money and has done so much to bring the construction industry out of its doldrums.

We have on hand several letters contractors have already sent to their congressmen. If any reader wants to send such a letter to his congressman and wants to see what other contractors have written, we will be glad to supply copies. Manufacturers should also make their wishes known and encourage their dealers to write letters.



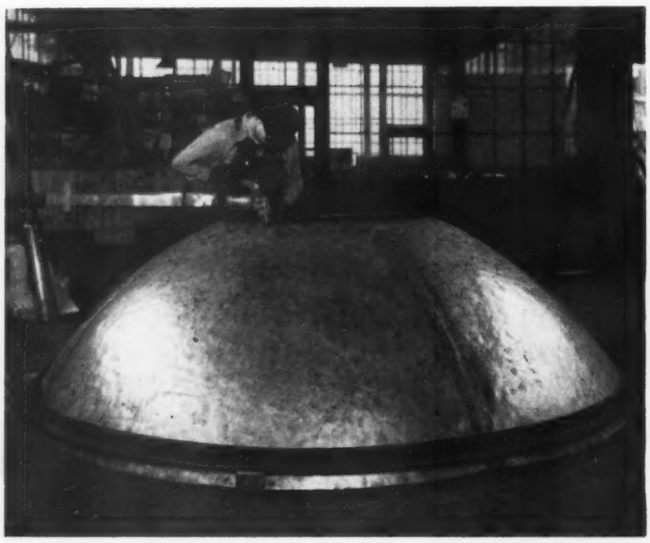
Polished, pure nickel brew kettle dome of material ⅛-in. thick; dome 10′ 6″ in diameter and 3′ deep. Fabricated of orange peel sections (see photos below) by oxyacetylene welding.

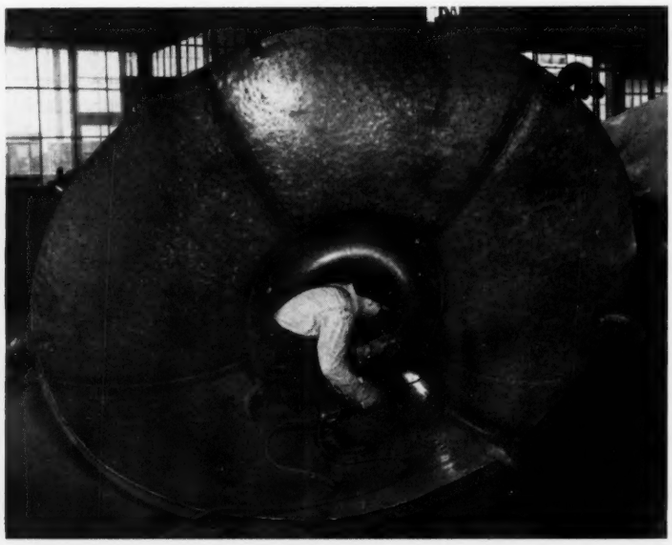
Nickel, Nickel-Clad, Monel Metals Fabricated For Brewery Modernization

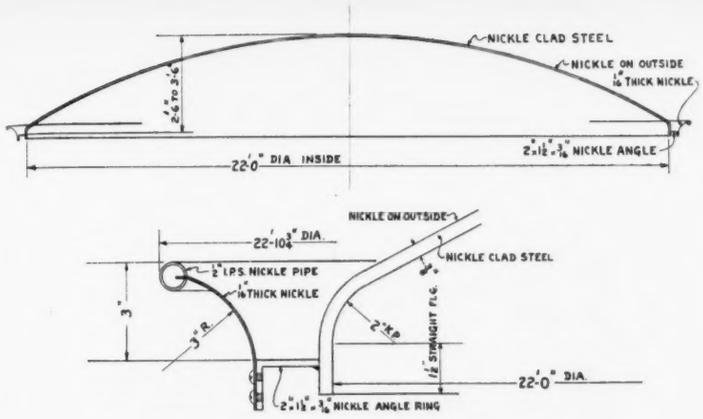
By R. C. Nason

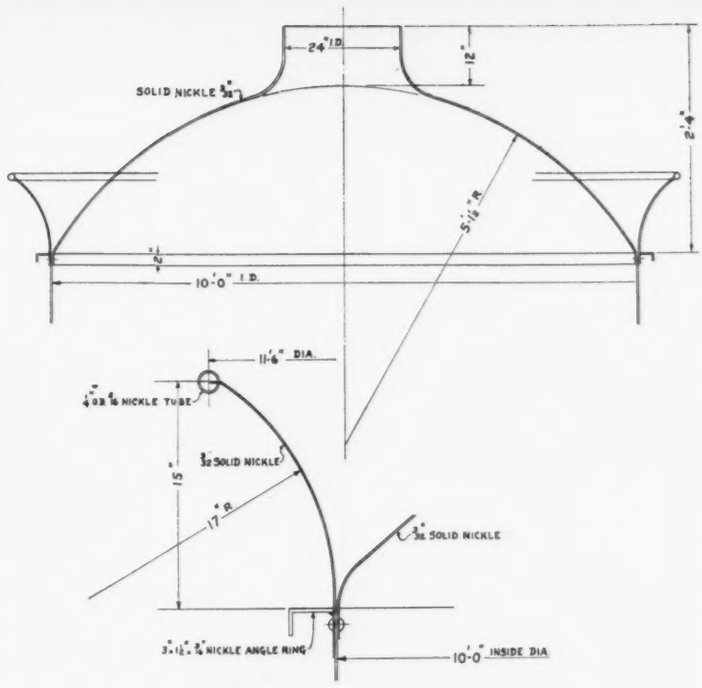
CONSIDERABLE significance is attached to the recent use of pure nickel, Nickel-Clad Steel and Monel, in the fabrication of up-to-date brewery equipment by Schock, Gusmer & Co., Hoboken, N. J., for installation by them in the Sudbury Brewing & Malting Co. plant at Sudbury, Canada. It is the intention of the brewers, in this case, to have the new brewing kettle, tanks and related new work installed on the first floor of their three-story plant and, through the use of large plate glass windows, exhibit thoroughly modern apparatus and brewing methods to any and all who would observe.

Although the well known New Jersey fabricators have a rather complete contract to bring this brewery up to the minute in all particulars, perhaps the parts of their work of greatest interest to readers cover the fabrication of a brew kettle, 10 ft. 6 in. in diameter, a combination mash and lauter tank 13 feet in diameter, numerous vent stacks and hoods, a "Grant," or control chamber, 5 feet 6 inches long, a hop strainer, 4 feet 6









Details of construction and assembly of the nickel domes, showing radii of arcs and construction of outer ring with pipe edge.

inches in diameter and numerous large diameter Monel and nickel pipes and bends as well as other miscellaneous apparatus. Many of the details of the finished work before its installation are presented in accompanying illustrations.

Supplementing the views, it may be pointed out that the dome of the brewing kettle is of ⅛-inch solid, pure nickel sheet. This dome will cover a Nickel-Clad steel brew kettle, which, to minimize shipping cost, was made in Toronto to the designs of the New Jersey contractors. Despite the gracefully curved cover, or dome, no spinning was employed in its formation.

To preserve perfect contour, the dome was made up in quads by hand bumping. Correct curvature was checked by periodical fitting over a template. When the quads were completed they were joined by oxy-acetylene welding on both sides, employing a square, butt joint. Subsequent to welding the surfaces were brought to a smooth finish by power hammering.

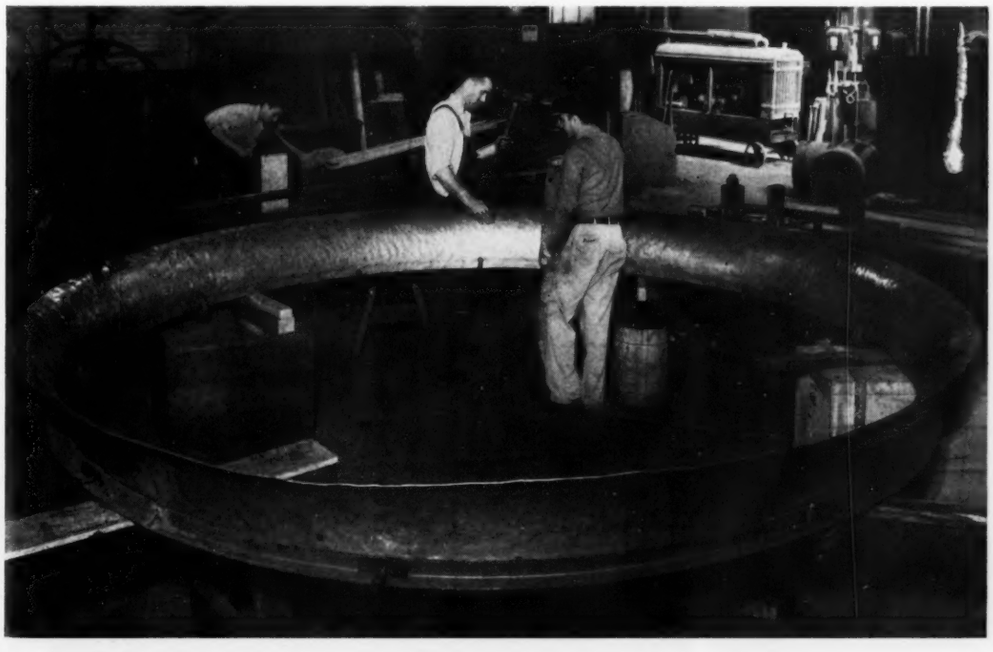
In the meantime other craftsmen were busy on the brew kettle throat. Curvature here, as in the previous instance, was obtained by hand bumping and template checking. The throat was made of a single sheet, its single longitudinal joint also being butt welded. After formation, the throat was welded to the dome. Subsequently a 24 inch diameter nickel ventilation stack will be connected with the top of the throat piece.

Around the top of the brew kettle there was welded a nickel angle 2 inches x 2 inches x ¼ inch that performs two duties. First, it supports an exterior "over-boiling" ring of pure nickel 1 foot high, $\frac{3}{32}$ inch thick, and secondly, it will retain the heavy air-cell insulation that will cover the entire periphery of the kettle. Details may be noted from the accompanying sketch.

In brewery practice, the aforesaid over-boiling ring not alone prevents the wort being boiled from spilling over, but also enhances the appearance of the kettle. The top edge of the over-boiling ring is neatly finished off with a 1¼ inch diameter by 16 gauge wall, seamless nickel tube. The entire ring is highly polished.

Although the brew kettle discussed was made of Nickel-Clad steel, its dome being of pure nickel, the 13 foot mash tank had its dome made of $\frac{3}{16}$-inch Monel. The mash tank is likewise insulated, and its sheath, or outer covering, was made of Monel instead of pure nickel which was used on the brew kettle. Both sheaths were carefully polished as a final step in fabrication. The joints of the sheathing are concealed by semi-oval nickel molding.

Breweries make use of "Grants" which are control



The "Over-Boiling Ring" for the brew kettle was assembled as a complete circle before connection to the dome. The details above show ring construction and method of joining to dome.

Pure nickel weather hoods used on vent stacks from the mash tubs. The hoods are assembled by gas welding of pieces as shown. The completed hood is reminiscent of ancient brewing arts.

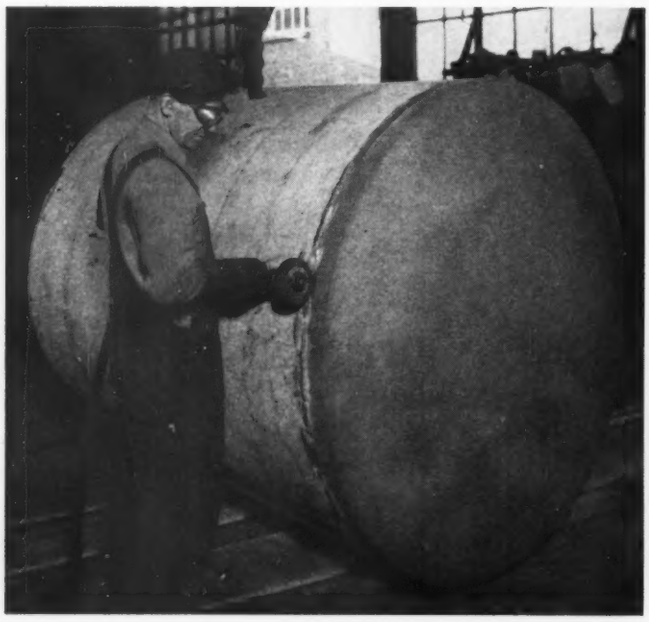
chambers for testing the quality of the wort. Grants are located between the mash tank and the brew kettle. The grant made by Schock, Gusmer & Co. for the Canadian brewery is 5 feet 6 inches long by 1 foot 6 inches in diameter and was made of ⅛-inch Monel. All joints were welded. It was made from sheet and the welded joints are so well done that one might almost think it is an extruded piece.

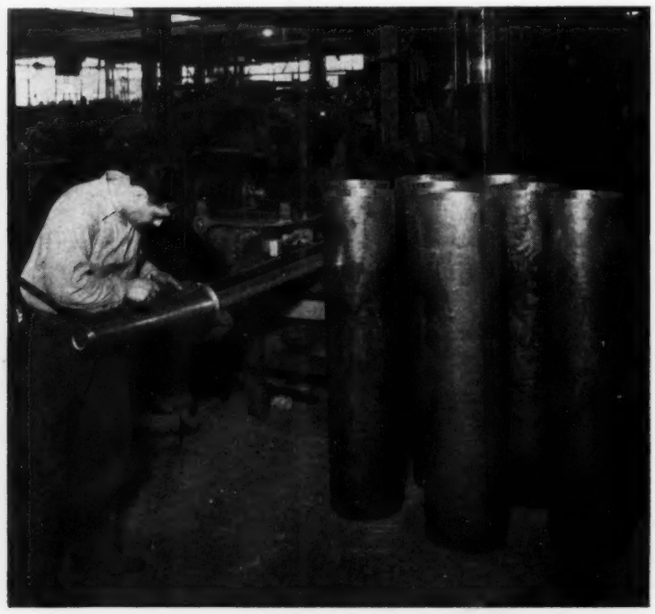
The horizontal hop strainer furnished in this contract was made of ¼-inch, 20 per cent Nickel-Clad steel plate. It is 4 feet 6 inches in diameter by 5 feet long. This tanklike apparatus follows the brewing process and takes the place of a hop jack.

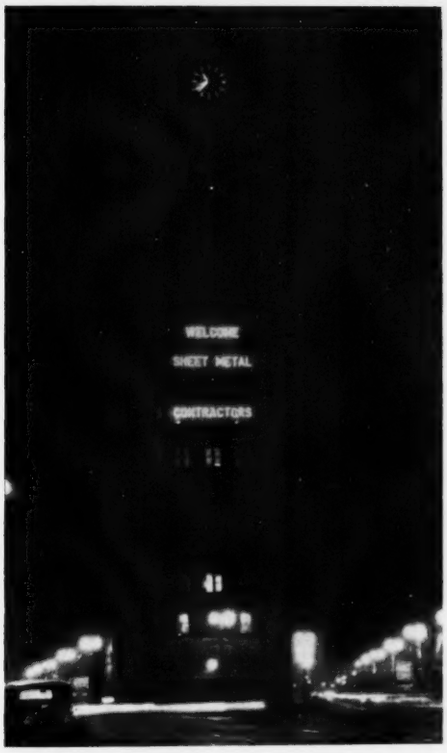
Altogether the Hoboken shop made and installed one 12-inch diameter Monel mash tank vapor stack welded from $\frac{1}{32}$-inch Monel sheet, and four pure nickel vents of 8-inch, 10-inch, 12-inch and 24-inch diameter welded from $\frac{1}{32}$-inch thick nickel sheets. In most cases the vapor stacks extended through three floors to terminate 40 feet above their origin, some 10 feet above the roof. The $\frac{1}{16}$-inch thick, pure nickel, weather hoods that surmount the stacks are riveted to the stacks. A serrated scallop fringe was riveted to the base of the weather hoods. Exterior pure nickel scrolls, conical spikes and 4-inch balls further adorn the hoods. All parts are riveted, except longitudinal vent stack seams, which are welded.

(*Continued on page 72*)

Nickel-clad steel hop strainer formed and electric arc welded from ¼-in. plate. The strainer is 4′ 6″ in diameter by 5′ deep. At right—Monel vent stacks fabricated by oxy-acetylene welding.







Wisconsin Studies Business and Engineering Problems

Milwaukee welcomed the convention with this huge electric sign on the city hall. Right — President elect for 1939, Walter C. Arndt, Milwaukee.

RAMIFICATIONS of business and social trends, legislation which affects our industry, taxes, insurance and codes, plus a full one-day school in mechanical warm air heating engaged the attention of Wisconsin contractors attending the Silver Jubilee convention of the State association, February 6, 7 and 8.

As to business and social trends and regulations which affect the conduct of business, speakers addressed the convention on association activities, heating and ventilating codes, FHA policies and results, the wage and hour law, the Wisconsin lien law, and how a state or local association can advertise its services.

Why Associations?

Phil. A. Grau of the Milwaukee Chamber of Commerce, declared that every organization has one paramount problem, namely, how to deal with the contractor who pays his dues but contributes nothing in time or service. Mr. Grau said he believed every organization should have some individuals who take issue with proposed plans, because when everyone agrees, nothing material is accomplished and that every member should air every difference of opinion on the floor of any given meeting and not take grievances home to mull over. Every association, declared the speaker, should recognize that a group has far more weight than any one individual and every association should sponsor those legislators who have known views favorable to industry because the time has passed when the individual business man can paddle his own canoe and give little attenton to matters of government.

H. I. Randolph, speaking for the Wisconsin Industrial Commission, the organization in charge of the Wisconsin Heating and Ventilating Code, declared that the Wisconsin code has drawn a considerable volume of complaint and that while some of these complaints will be rectified during coming months, every organization which does business under the code should see to it that the particular points of controversy are brought to the attention of the commission. Prominent among revisions will be changes in the section on thermal control which allows reduced outside air volume at the will of the designer. Also in those regulations covering room air quantities which are not satisfactory as to cubic feet of air per occupant or per given area of floor space. Mr. Randolph asked that all contractors doing business under the code should present to the commission in person or by letter exactly the revisions which they consider essential.

Unemployment Compensation

Warren S. Katz, also of the Industrial Commission of Wisconsin, speaking on unemployment compensation and old-age pensions, explained the general provisions of the Federal act and the complimentary Wisconsin State Act, and explained how each Wisconsin employer has an individual reserve fund bookkeeping amount. Under this method of bookkeeping, the employer pays into the fund according to the rate of tax in effect for the industry as a whole until such time as his reserve fund reaches a predetermined proportion, whereupon automatically his rate of tax payment is reduced and

continues at the reduced rate until accidents or unemployment necessitates further building up of the fund when the rate of tax is again increased. Wisconsin law has been in effect longer than most states and Wisconsin already has begun payment of unemployment benefits.

Beginning with 1939, approximately ten percent, or about 1,000 employers out of the 11,000 registered in Wisconsin will pay nothing or pay only 1 percent tax rate to the individual fund, but if unemployment increases during 1939, then the tax rate for these concerns will be increased 2.7 percent or even to 3.2 percent for 1940.

Wisconsin FHA Accomplishments

W. W. Gates, discussing the Federal Housing Act, said that, in his estimation, the granting of 20 to 25-year mortgages has resulted in general better construction throughout Wisconsin. Mr. Gates declared that FHA confidently looks to 1939 as the biggest home building year since 1929 with from 7 to 25 percent increase over 1938 in number of houses built.

Of particular importance, in the estimation of FHA, is the fact that in Wisconsin mortgages approved during November, December and January exceeded or maintained the rate of the previous fall, a situation which has not heretofore been the case.

Federal Wage-Hour Law

E. F. Halverson, speaking on the Federal wage and hour law, outlined the general aims of the bill as 25 cents minimum wage per hour and 44 hours a week maximum, these rates to be changed to 30 cents per hour and 42 hours per week in 42, and to 40 cents per hour and 40 hours of work per week in the future.

In the speaker's opinion building mechanics and the contractor employing the building mechanic, as a general rule, will not be considered as operating in inter-state commerce, but each individual case will have to be decided on its own circumstances. In some cases rulings have been passed down that contractors doing maintenance or construction work for firms definitely ruled in interstate commerce were declared eligible under the wage and hour law. Mr. Halvorson emphasized that all of the regulations issued recently have been rulings of one individual or an individual office and eventually all such rulings will have to be finally decided in some court.

Association Cooperative Advertising

G. E. Stedman, explaining what services an association can legitimately advertise, declared that business in general is pretty good, government seems inclined to be more co-operative, there is more money available for house construction and home remodeling, there is more employment in many areas and all of these should add up to a better and more profitable 1939. Mr. Stedman cited a survey among some 27,000 women indicating that 4.8 percent of the families represented are thinking of building a new home in 1939. The secret of any successful sales campaign is "Get more salesmen to see more people." Co-operative advertising can solve the problem of the contractor who sells on price only by emphasizing legitimate prices and legitimate contractors and thereby place the burden of proof for low prices on the low-priced quoter.

Mr. Stedman declared he believes competition for the consumers' dollar will gradually increase and that one means of getting a larger percentage of this dollar is co-operative advertising which is the cheapest type of promotion and properly handled will return the greatest value for the money expended. Steps which should be taken by any organization contemplating co-operative advertising are (1) adopt a symbol of association practice; (2)

Officers and directors for 1939. Seated, left to right—V. P., A. Mantei; Treas., W. Marth; Sec., P. Biersach; Pres., W. Arndt. Standing, left to right—V. P., M. Schaar; Sarg., B. Zahn; V. P., R. Schomann; V. P., T. Brenner.

appoint a committee to survey the selling methods of members and collect those methods which are best adapted to co-operative advertising; (3) formulate a publicity and promotional campaign as to media and amount of money to be spent; (4) conduct inspirational sales meetings where all the members of the industry can come to find out just what they can do to increase their sales percentages.

Wisconsin Lien Laws

Thomas Kelley, discussing the Wisconsin lien law, declared that Wisconsin is known as a "liberal" lien law state, which means that the state goes a long way to protect the contractor or material man who has supplied services or material for a given structure. Mr. Kelley explained briefly how liens should be filed and when, emphasized the importance of filing liens immediately since the building and loan association recently had a bill enacted in

For the first time in many years, Wisconsin sold display space to manufacturers and jobbers. Two views of the fine display of equipment.

Wisconsin which makes all liens null and void if the building and loan has sold a mortgage prior to the filing of the lien. Mr. Kelley explained how the lien notice can be sent to the owner in the form of a letter without actually following the ordinary lien form.

Engineering Session

The highlight of the technical portion of the convention was the one-day school staged by F. L. Meyer and R. M. Wallis of the Meyer Furnace Company, Peoria. Contractors were furnished with two sets of plans—one plan for an individual duct system and a second set of plans for a trunk line duct system installed in a typical residence with heat loss and data sheet completely filled out and a full explanation of the step by step design procedure. As a part of this complete set of sheets, tables of areas in square inches of pipe and registers; rectangular and round branch pipe areas for equal friction; typical heat loss co-efficients for different materials and wall construction; air deliveries in Btu per hour of heat loss at given register temperatures; air delivery volumes for different stacks, register and branch pipe sizes, were given to each contractor attending.

From duplicate plans placed on display contractors were taken through the calculation of heat losses, the estimation of register air temperatures, bonnet air temperatures, temperature drop in ducts, air volumes required for registers, stacks, branches and mains, velocities throughout the system, and pipe construction.

Short Cut Engineering

G. A. Voorhees briefly announced the new book "Forced Warm Air Heating," by S. Konzo of the University of Illinois, published by the National Warm Air Heating and Air Conditioning Association and passed out to contractors simplified tables of heat loss data and required main, branch, stack and register sizes for registers at different distances from the bonnet, for commonly used bonnet or register air temperatures and explained how these sheets could be used for quick calculation. In justification of so-called "short-cut" methods of engineering design, Mr. Voorhees declared that a great many contractors do not have the ability to apply or do not care to spend the time necessary to learn the intricacies of the technical code; also that this contractor (doing a run of work on houses of pretty much the same size, construction and design) can use short-cut methods without danger of undersiz-

ing his system or getting unsatisfactory heating results.

Fans and Blowers

Ernest Szekely, speaking on blowers and fans and proper installation thereof, said air handling equipment and air handling systems (in other words residential winter air conditioning installations) have lately become a saleable commodity. This acceptance of mechanical warm air heating has brought the problem of proper selection of the fan and other apparatus and, happily where the selection of a fan was a troublesome problem several years ago, fans in general have tended to become standardized and the contractor to-day must only select the type and the reputation of the manufacturer. Mr. Szekely discussed the general charac-

(*Continued on page* 104)

APPLICATION

GICHNER, INC., 418 6th St. N. W., Washington, D. C.

Date.....

Name..... Age..... Weight.....

Address..... City.....

Married..... Single..... Divorced..... Children (No).....

Years of Experience.....

Learned Trade with..... Date.....

Employed by .....Give Address..... How Long.....

.....

.....

.....

.....

.....

Now employed where.....wage per hr.....

Are you employed as foreman.....1st class.....2nd class mechanic.....helper.....

Are you a sheet metal worker.....roofer.....both.....union.....non-union.....

Are you an inside man.....outside man.....both.....

Put a cross (X) next to the following items you are thoroly capable of doing:

Cornice .....layout.....form.....erect.....

Skylights .....layout.....form.....erect.....

Louvres .....layout.....form.....erect.....

Ventilating .....sketch.....layout.....form.....erect.....connect motors.....

Roofing .....tin.....copper.....composition.....

Roof repairing .....tin.....slate.....copper.....slag.....tile.....canvas.....

Erect .....gutters.....spouts.....ventilators.....flashing.....

Solder .....Braze.....Arc Weld.....Spot Weld.....

Can you work.....Monel.....Stainless Steel.....Chrome Plated Zinc.....

Aluminum..... Steelcrete.....

Job Applicants Always Exaggerate

This plan checks their claims

By Lawrence E. Gichner

Gichner, Inc., Washington, D. C.

HERE is a method for selecting skilled mechanics and new employees that saves time, money and energy.

Most important it gets the right man.

Expensive experience has taught that focusing attention on only what the applicant *says* is terribly misleading. For example, our attractive union scale of $1.50 per hour in Washington unfortunately made liars out of men in over-statements and exaggeration. Employers are inclined to judge by intuition, inclination and "guess." To eliminate this confusing method, with its human element of fault, this scientific plan found birth. Before the system was developed, we made selections from letters, like thousands of others do today, totally disregarding the former employer, a source of most valuable information.

At times when our local union headquarters are unable to furnish mechanics, a classified advertisement is run in the Washington, New York, Wilmington, Chester, Pa., and Philadelphia papers.

Before the forms were developed, each day's mail brought dozens of replies from those who have not even the first requirement, and from men who are supposed experts. Letters are short; letters are long. Some simply stated "I have had 20 years experience." Others go into a lengthy history. Naturally the lengthy letters, more detailed, could be judged, but the information was not complete.

It was found some good mechanics are poor letter writers and some poor mechanics missed their vocation as correspondence secretaries. Interviews are apt to be misleading. Men, anxious for employment, inflated their ability, hoping against hope that if they secured the job they could somehow or other bluff their way through or maybe with terrible straining, make good.

Poor "guesses" on our part prove to be a waste of time, money and considerable effort. Men are too often employed who, in short order, have to be dismissed. To bring some consistency of fact and rating into their selection, Gichner, Inc., devised two form blanks.

CONFIDENTIAL QUESTIONNAIRE

From GICHNER, INC., 418 6th St. N. W., Washington, D. C.

Date.....

Gentlemen: Will you please do us the favor of helping us judge the capabilities of..... age..... weight..... who has applied for a position as sheet metal worker and roofer. He states he was in your employ for.....

Is your memory hazy.....or do you readily recall this man.....

Please be candid as to the character of the man. Cross (X) only one of the following characters.

1. Is he a foreman.....first class.....2nd class mechanic.....helper.....
2. About when and about how long was he in your employ.....
3. Is he reliable.....or not dependable.....
4. What class worker.....average.....energetic.....industrious..... indifferent.....lazy.....
5. Does he turn out a neat.....or slop shod job.....
6. Has he initiative qualities.....or just a machine.....
7. Is he a heavy drinker.....Is he Healthy.....
8. Has he any defects in sight.....hearing.....speech.....or body.....

PLEASE cross (X) any or all of the following items he is thoroly capable of doing.

Cornice .....layout.....form.....erect.....
Skylights .....layout.....form.....erect.....
Louvres .....layout.....form.....erect.....
Ventilating .....sketch.....layout.....form.....erect.....connect motors.....
Roofing .....tin.....copper.....composition.....
Roof repairing .....tin.....slate.....copper.....slag.....tile.....canvas.....
Erect .....gutters.....spouts.....ventilators.....flashing.....
Solder .....Braze.....Arc Weld.....Spot Weld.....
Can he work.....Monel.....Stainless Steel.....Chrome Plated Zinc..... Aluminum..... Steelcrete.....

Some mechanics may be poor letter writers and equally poor talkers; but any man can make a check or cross on a piece of paper behind a word or group of words.

To the replying applicant, form No. 1 is mailed. On its return, a confidential form (No. 2) is mailed to each of the given references. If these replies are good, they are then checked against form No. 1.

What the reference writes is most important. Not only do they fill in the forms, but may, in addition, write detailed letters. A self-addressed, stamped envelope is always enclosed. Replies read "good general sheet metal worker." "It is a pleasure to recommend this man to you." "You will find him, I am sure, a very satisfactory workman." "This party was a first class man and dependable."

"This is a very good man, but he insists on working by himself and is disagreeable when working with other men. He wants to pick his job; we could not let him do this and laid him off." "We cannot find his name on our records." "Cannot recall this man." "No record of employment here."

From form No. 2 it is a simple matter to turn to form No. 1 for additional data. Suppose a ventilating man is desired. At a glance, the range of a man's knowledge and experience is revealed in reply to the single question.

"State size of ventilating ducts on which you worked." The individual who answered 12-inch x 12-inch divulged his acquaintance with only small installations; while the applicant who stated 6 inch x 10 inch to 48 inch x 60 inch presented a different picture.

This plan has been used for some time and has demonstrated highly satisfactory results.

Reciprocal Buying—An Outmoded Evil

American Artisan:

Under the attack on business by the present administration we manufacturers like to feel that we are martyrs. We know the attack is unjustified, in general. Government, however, has uncovered some abuses which are real enough to justify action in some cases.

One of these abuses which as yet has not been the subject of regulation, but which will and perhaps should be, is that of reciprocal buying. This exploded theory is continued only because of its age, not because anyone in industry finds it a satisfactory method of placing business.

Industry, at great expense, sets up a purchasing department, an inspection department and an engineering department, to produce material of proper price and quality. After having done this they put in a reciprocal relations department which overrides the decisions of the buyer, the inspector and the engineer. Business, so placed, frequently results in strained industrial relations since no one can buy in a volume to satisfy the reciprocator. Not only that, but the distribution is never fair from the seller's point of view.

Reciprocal buying results in higher prices since the reciprocator cannot get the best price available. It results in lower quality since the reciprocator cannot insist on quality. It results in lack of standardization which enormously increases cost of upkeep.

I can see the joy with which government will pounce on this industrial foible to show how incompetent is the

(*Continued on page* 106)

OVERHEAD

When Recovered or Neglected Determines Profit or Loss

By B. F. John

IN the middle of a discussion of overhead expense at a Philadelphia association meeting a contractor said: "Without the right kind of books and records our tools are of no value to us, no matter how much work we do. Our books tell us if we're making any money with tools and men; if each is best fitted for the work we do. Books don't need to be complicated—just simple records that we can understand. What good are our tools if we can't make the money we think we ought to have for our work. Poor books are reason for low prices."

While poor books are not the *only* reason for low prices, records are among the important factors, for the contractor who does not keep balanced books (in which he separates the money he spends for material, labor paid and expense) cannot hope to add the proper proportion of each to his estimates and bills to secure the profit he asks. Records for 14 years in Philadelphia shops show that much or all of the profit asked was lost mostly because the money spent in doing the work was not accurately known and therefore guessed at. Also, this guessing habit is automatically used on orders received without competition from regular customers. The contractor then is his *own* low-price, cut-throat competitor.

In the large majority of Philadelphia jobbing shops a survey made in 1932-33 showed that a very fair proportion of the volume each year in most shops is received with no, or little, competition, and that such estimates are often asked just to acquaint the customer with the cost so he can determine whether he can afford to have part or all the work done at the moment, or to give him an opportunity to arrange to meet the bill when the work is completed; or to compare estimates with market prices.

Interviews with delinquent debtors or those who had a complaint to make concerning the manner in which the work was finished, in connection with the Trade Association "Credit & Collection Bureau," proved this to be true. In a number of instances when it was told how the job was awarded without competition prompt settlements were made after the complaint was adjusted.

"I did not restrict the price nor did I know how the

STATEMENT—SHOP No. 2

SALES—total for 1929 (bills sent out)			$21,202.39
YEAR'S COST			
Material (cost for material used)	$ 9,015.67		
Labor—Productive (actual wages paid men)	5,901.00		
Expense (overhead for the year)	6,999.13		
		21,915.80	
LOSS			$ 713.41
How the LOSS was made			
Material at Cost, as above	$ 9,015.67		
Material as charged on bills	8,025.05		
Loss		990.62	
Labor (paid men) as payroll	$ 5,901.00		
Labor (charged on bills)	5,222.95		
Loss		678.05	
Overhead—Expense spent	$ 6,999.13		
Overhead—Expense added to bills	5,179.55		
Loss		1,819.58	
Total of First Loss			$ 3,488.25
PROFIT MADE			
Profit as added to bills	$ 3,022.07		
Loss shown on some jobs	247.23		
		2,774.84	
NET LOSS			$ 713.41

SHOP No. 1

Sales total for 1929 (bills sent out)			$23,251.82
YEARS COST			
Material (our cost for material used)	$ 9,709.68		
Labor—Productive (actual wages paid men)	5,222.49		
Expense (overhead for the year)	5,047.26		
		19,979.43	
PROFIT (Net) for year			$3,272.39
How the PROFIT was made			
Profit as added to bills and estimates	$ 3,711.61		
LESS—Loss on contracted estimates	390.89		
Net Profit as shown by Job Sheet (see Note 1)		3,320.72	
MATERIAL, as charged at supposed cost to bills	$10,189.43		
MATERIAL, exact cost of Ledger Balance, as above. (See Note 2)	9,709.68		
		479.75	
LABOR—Productive, as charged at cost on bills	$ 5,409.51		
LABOR—At COST from payroll. (See Note 3)	5,222.49		
		187.02	
Discount earned on prepayment of bills		246.67	
FIRST Total Profit		$ 4,234.16	
LOSS			
Overhead (miscellaneous yearly expense)	$ 5,047.26		
Overhead as charged on bills	4,085.49		
		961.77	
NET PROFIT (as shown above). (Note 4)			$3,272.39

Note 1—$ 3,711.61 is the total profit added or asked on jobs.
and 390.89 is the loss on jobs after completion, as shown on Job Record Sheets.

Note 2—$10,189.43 added as COST of material used on job sheets.
9,709.68 real Cost from Material ledger balance.

$ 479.75 overcharged as COST.

Note 3—$ 187.02 excess charged over payroll actual.

Note 4—$ 5,047.26 expense spent during the year.
4,085.49 expense charged to bills.

$ 961.77 expense NOT charged.

work was to be done; I only wanted results and a good looking job. Fix it and I'll pay the bill," said one customer, typical of the attitude of many others where disputes were taken to the Bureau. Numerous customers (who had settled their bills after corrections were made) frankly stated that the contractor's price was often lower than they expected and they would have paid more if asked as they had already decided to give the order because of some recommendation, providing the price was within reason. In some cases, where the true cost showed little or no profit, several contractors admitted they could "just as easily have obtained more for the work."

A survey in 1932-33 in 18 shops of various sizes was made in order to determine what expense might be omitted or reduced to lower the overhead percentage (without affecting the efficiency of the shops) and thus assist in partially meeting the lower prices that then existed due to the decrease in the volume of business. This search required an analysis of details and procedure, and individual accounts, as well as an analysis of the average volume for the current year. This "estimated" volume was based on the amount of business the shop could expect from regular customers who, year after year had patronized the shop, less a safety percentage; to which was added a percentage from transient trade as experienced in four previous years, less a safety percentage.

The almost certain volume of business from the regular customers was found to amount to from 26 to 38 per cent of the average total volume for the years 1928-1929. The proportionate percentage of material, labor and expense as shown for 1928-29-30-31 was used to estimate each cost for 1932-33, with an adjustment in these estimates for the drop in volume. 100 per cent of Productive Labor or 45 per cent of the total of Material and Productive labor was used to find the allowable overhead for 1932-33. During 1933-34-35-36 these estimated volume figures proved to be fairly accurate as a basis; at least none of the shops had overestimated, but 11 had underestimated the prospective volume in each year which was to their advantage.

This search brought out an interesting and indisputable fact—the actual size of each shop's overhead expense in dollars and cents and showed overhead's percentage to other costs more clearly than ever before. Overhead stood out like a "sore thumb" each week and month as the largest item that had to be paid from a dwindling bank account.

How Profit or Loss Happened

A number of contractors who *estimated* their overhead expense, after listening to the many discussions, hired an accountant to prove to themselves that "Most of the discussion was 'all bosh,'" and found to their dismay that several of the years in which *their books showed a profit,* the accountant's statement showed a loss. Prior to 1924 this break down generally showed a loss in all three costs—Material—Productive Labor and Expense; the money spent for each expense had not been fully recovered in the charges on the customers' bills. This is shown in the statement for Shop 2.

(*Continued on page 72*)

How Contractors Can Derive Help from

The N.W.A.H. & A.C. Assn. Publicity Campaign

By Allen P. Ames
Director of the Program

IF any home owner, home builder or home occupier in the United States isn't aware this spring that a great many home heating systems—probably including his own—have been put out of date by the new equipment and methods developed within the last few years, it won't be the fault of the industries most concerned. It is safe to say there has been more promotional publicity in the newspapers and magazines, and over the radio, for modern methods in home heating and air conditioning, during recent months, than ever before in any similar period of time; and it is going right on.

The lead in this effort is being taken by the National Warm Air Heating and Air Conditioning Association, which is now regularly releasing articles and news items—in many cases in response to direct requests—to more than a thousand newspapers and magazines, and is supplying radio talks on warm air heating and air conditioning problems to 125 broadcasting stations throughout the United States.

All this means business. It means business, in particular, for the heating contractor who is alert to the opportunities this campaign cannot help but create for him. The question is, how he can best set about getting his full share?

All that the most plentiful and persuasive publicity can do is to create opportunities for sales. It cannot create sales; and nobody who knows how heating equipment is sold—how it must be sold—expects it to. It will help a great many people to realize how badly out of date and inefficient their present furnaces are; but that alone isn't going to bring them down to your shop with fire in their eyes and bills of large denomination clutched in their fists, begging you to take your thumbs out of the arm-holes of your vest and condescend to sell 'em a new furnace with all the latest gadgets, including provision for summer cooling equipment. Nothing dies so rapidly as an impulse to buy something new, if it isn't caught at the right moment and actively nourished to the point where it blossoms into a sale.

Suggested Contractor's Tie-in

How can you nourish those impulses when they spring up, unless you know the people in whose bosoms they are springing; and unless they already know about you? The answer to that one, obviously, is: you can't. That means, first, you have to know your market—your own city, your own town, your own neighborhood—and the people in it; and second, you have to make them know you, by your own local advertising and promotion plan, going right along and using the momentum of the national campaigns.

You are selling the same things the national promotion is selling:—home comfort all the year around; greater fuel economy; less trouble, dirt and annoyance; more attractive and livable homes, more adaptable design of modern heating apparatus. And don't forget, either, that modern forced-air heating apparatus, particularly, is the best, least expensive and simplest first-step toward an ultimate . . . and highly profitable . . . sale of complete year-round air conditioning equipment.

Surveying Your Area

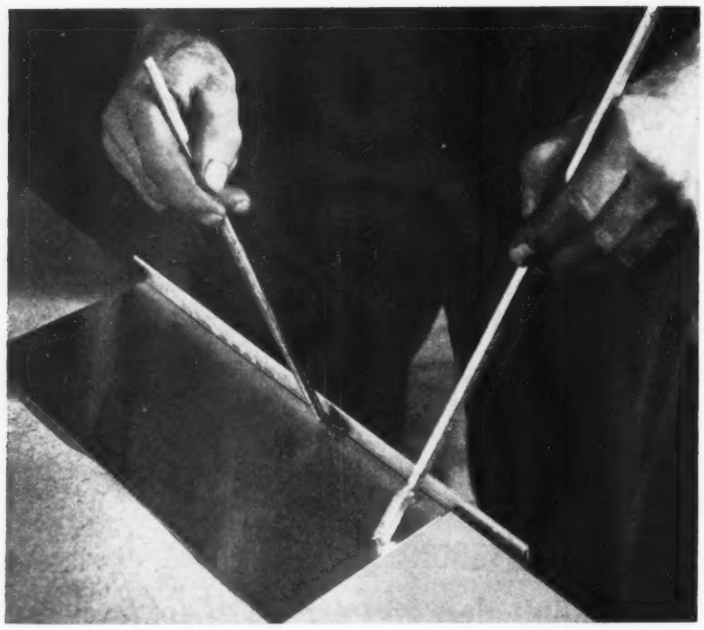
First, count noses. How many families are there, in your own city or town, and how many right in your own neighborhood, nearer to you than to any other contractor, who have heating installations more than ten years old? It would even be worth your while to go out—and send all your men out—every evening for a week, just to ring door-bells and inquire if you may ask a few questions about the heating system, or even permission to step down cellar and make a few notes for yourself.

Suppose you did that; and out of a hundred calls, you found ten homes where they plainly needed a new furnace; ten others where your preliminary talk indicated the people were interested in hearing about the new improvements in heating methods; and ten others where you might at least sell a blower to improve the operation of the present furnace and pave the way for summer air conditioning. Well, if you find that much possibility for business in a hundred homes, it's easy enough to figure what your chances are in a thousand homes . . . or two thousand, or three. It's also easy enough to figure how much you can afford to spend to sell that many furnaces or fans or humidifiers—or to get in touch with that many new customers.

After that you can plan your own sales campaign. Naturally nobody who doesn't know the actual conditions in your own town, can tell you exactly how much advertising to do, of what kind, or in what newspapers. But there are some general rules that are worth following. One is, don't put all your eggs in one basket—don't depend exclusively on newspaper advertising and don't depend wholly on

(*Continued on page* 50)

CHICAGO, Ill.
HERALD EXAMINER
NEW YORK TIMES
HEATING PLANT CARE PROBLEM TO INDUSTRY
Still Seeks Means of Shifting to Householder
Humidity Helps Preserve Your Furniture
CINCINNATI, Ohio
TIMES-STAR
Year-'Round Ease Within Reach of Average Family
NEW YORK, N. Y.
SUNDAY JOURNAL & AMERICAN
OLD TYPE HEAT PLANTS IDEAL COOL HOU
CINCINNATI, Ohio
POST
Chimney Insulation
NEW YORK HERALD-TRIBUNE
Air-Tempering Industry Prepared for Demand
WASHINGTON STAR
Review Tells Advances In Air-Conditioning Equipment
MIAMI DAILY NEWS
Air Regulation Made Available
WHEELING, W.V.
NEWS
INDUSTRY
NEW YORK WORLD-TELEGRAM
Warm-Air Furnace Declared on Way Back to Supremacy In Home Heating, Spurred by Advent of Air Conditioning
CHARLOTTE, N.C.
OBSERVER
Air-Conditioning Now Available To Everyone
PONTIAC, Mich.
PRESS
SNOW ON SNUG R KEEPS HOUSE
BURLINGTON, Vt.
FREE PRESS
Air-Conditioning Is Easy
PHILADELPHIA RECORD
Keep the Home Fires Burning
BURLINGTON, Vt.
FREE PRESS
Heat And Humidity Need Right Balance
MEMPHIS, Tenn.
COMMERCIAL APPEAL
VENTILATION STUDIED FOR EFFECTS ON C
OLEDO, Ohio
TIMES
NEW YORK TIMES
ASKS JOINT ATTACK ON HEATING WASTE
Air Conditioning Cost Not High for Homes
JOHNSTOWN, Pa.
TRIBUNE
Forced Air Heating Me Saving in Fuel Consumpti
NEWARK, N.J., CALL
Air Condition M Is Ready
WHEELING, W.Va.
NEWS
AR 'ROUND HOME AIR-CONDITIONING
MIAMI, Fla.
HERALD
AIR COMFORT AT LOW COST
MANCHESTER, N.H.
UNION
me Air-Conditioning ntinues to Advance
DALLAS, Texas
DISPATCH JOURNAL
Don't Be Afraid To Pile On Coal
JOHNSTOWN, Pa.
TRIBUNE
LISHMAN FIRST TO CONDITION AI
Paxton, English arch as apparently as good



The joint to be soldered should be etched with special flux applied only to the narrowest possible surface.

Recommended Practices for

Soldering Stainless Steel*

SUCCESSFUL soldering of all metals depends on how well the solder will adhere to the surface. Soldering is unlike welding where a perfect fusion is obtained between the surfaces to be joined together. It does not alloy with the metal, and if grease or dirt is present, a firm bond is not produced. It is also found that preliminary roughening of the surface will make a much stronger joint, that is, the rougher the surface the better the adhesion value.

The question is often raised as to why soldered joints of copper or brass can be deformed without rupture at the joint, whereas the same type of joint made in stainless steel may open up. This is readily explained by the degrees of hardness or stiffness of the metals themselves. Copper and brass are very soft and the strength of the solder joint is equal to or in excess of the base sheet or strip. On the other hand, stainless steel is a relatively stiff metal, exceeding the strength of the solder bond many times. This extra stiffness may oftentimes require a slight change in the design of the joint. *It is preferable at all times when stainless steel is to be joined together to use the solder for a seal only and to design the joint for mechanical strength by double seaming, riveting, spot welding or some other adopted method known to give good mechanical strength.*

Preparation of Surface

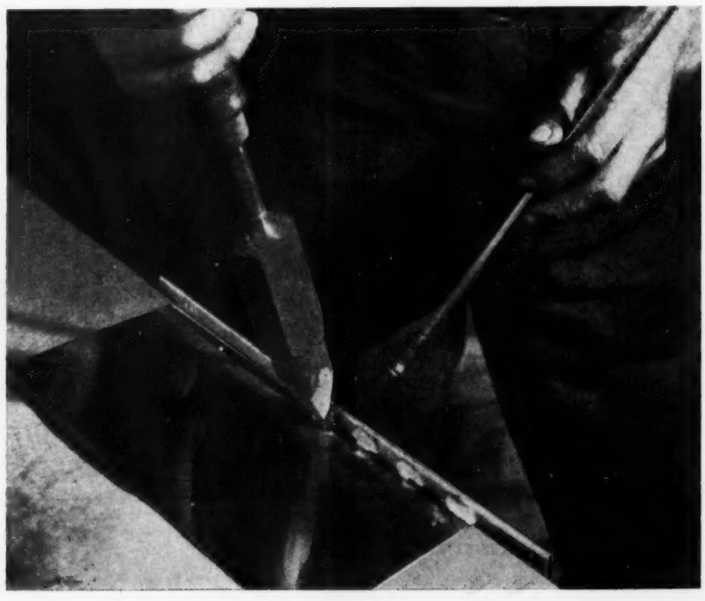
In making joints on stainless steel it will be found that mill finishes No. 1, 2-D or 2-B will tin very readily with cut acid or most liquid fluxes. The surface on polished stainless, such as No. 4 or higher finish, should be roughened by the use of emery cloth or grinding wheel to obtain the best adhesion. If neither of these are desirable, a solution containing a mixture of 50 parts ferric chloride, plus 90 parts of muriatic acid, plus 3 parts of nitric acid, may be used to roughen up the surface. Apply this solution only where it is desired to have the solder adhere, allowing it to remain several minutes. Carefully wipe off the excess solution, making sure it does not come in contact elsewhere on the part being fabricated. Two to five minutes will generally etch sufficiently deep to proceed with the tinning and joining operations, using a good stainless steel soldering flux.

Most troubles encountered on soldered joints when poor adhesion of the solder is the cause are generally traced to the flux used. A number of prepared fluxes are now on the market for stainless steel, among these being Al-Sol, Spears, Towners, Ruby Fluid, and many others.

With recent developments, the finish on stainless steel cold rolled strip has been improved considerably. The surface of this strip is heavily planished and very tight, being very bright with great depth of color approaching a mirror finish in reflectivity.

Such hard surfaces may present some difficulty when joints are to be made using 50-50 solder applied with an ordinary soldering copper. This is due to insufficient roughness on the surface for good adhesion. Furthermore, the surface is so smooth that flux will stand up in drops, and when the copper is run over the seam there is insufficient time for the necessary etching action to take place.

Spot soldering holds parts together and helps to get the solder well sweated into the folds.



**Condensed from the booklet "The Fabrication of Republic Enduro Stainless Steel," shortly to be issued by Republic Steel Corporation, Cleveland, Ohio. All photographs from the same booklet.*

To overcome this difficulty, add approximately one teaspoonful of glycerine to one cup of the commercial stainless soldering flux being used. This will give the flux sufficient surface tension to wet the surface thoroughly, assisting in completing the solder joint in the regular way.

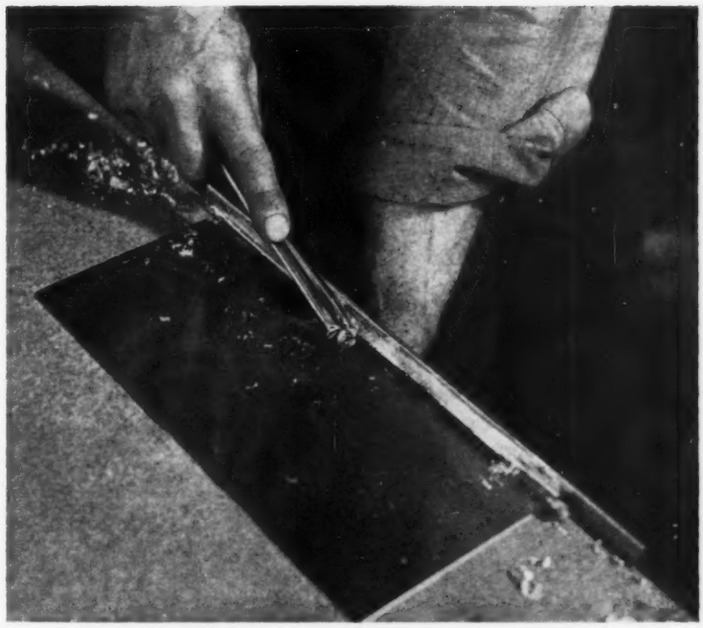
Stainless steel fluxes are usually highly corrosive and should be neutralized as quickly as possible after the joints are made. Wash the entire part, particularly the joint, totally immersed if possible, with a salsoda solution of 5-10% concentration, using a soft rag. This neutralizing treatment should never be overlooked and should be done as quickly as possible after the joints are made. *Under no circumstances should the flux be allowed to remain on the material over a period of time.* After neutralizing, rinse with clear water, warm preferred. The water spots can then be removed with Bon Ami or whiting.

Solders

Three types of solders are generally used, ordinarily half and half, sixty-forty or block tin. Half and half solder containing 50% tin and 50% lead is used most widely. It flows smoothly and adheres to the stainless, giving a good strong joint. There are some cases where a stronger joint, having greater corrosion resistance, is required. These are where 60-40 and block tin are used, but most fabricators choose block tin for such requirements in preference to 60-40 which is claimed to be only slightly better than 50-50.

A large soldering copper should be used, heating just above the melting point of the solder. This will assist in eliminating the buckling or warpage so often encountered where a smaller very hot copper is used and the large copper will retain its heat longer with the lower temperature.

The heat conductivity of stainless is much lower than the non-ferrous metals used by most shops,



Excess solder should be scraped away with a sharpened piece of soft stainless steel. Common steel may ingrain particles which later rust.

therefore the solder will not flow as far into the joints. To obtain full flow throughout the joint, the copper should be held on the top or bottom of the lap instead of at the edge of the seam, and the speed reduced to allow all parts of the joint to become thoroughly heated.

Joints

All types of joints used by the sheet metal worker are readily made on stainless steel, and the proper procedure for each will be considered individually.

The plain or lap joint can be used where it will not be stressed to any great extent. Design of the part fabricated will determine its use. The edges to be joined first should be roughened as previously described, tinned, then sweated together. By far the best method is to roughen to give the solder a good hold, tin the surface using stainless flux, neutralize, then spot weld at regular intervals for mechanical strength and seal the joint with solder using cut acid or stainless steel flux.

Riveting, followed by a soldered seal, is sometimes resorted to on lap joints. This gives a sound joint mechanically, but the trade does not accept this method as a good appearing job due to the unsightly rivet heads showing.

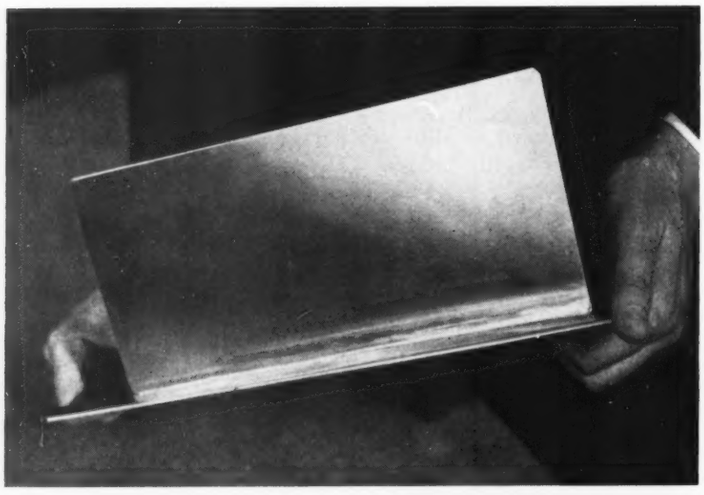
Lock seaming, plain or flush, key lock, standing end, side, folded end or inside lock can be readily made on light gauges of stainless. It is preferable to tin all edges before bending, then sweat together, adding solder if needed. A large copper should be used, holding it on the folded part of the seams instead of trying to fillet it in from the edge. This will assure full penetration of the solder. For most small articles no added reinforcing will be required,

A large iron, traveling slowly, on or against the fold induces complete sweating and makes a strong joint.

but where large cans or vats are to be lined it is preferable to reinforce seams with rivets at points where stress may occur.

Many times it is found that only butt joints can be used. For such jobs use of the strapped butt joint is suggested. This also holds well for mitered corners. The strap should be spot welded to the sheets and gussets can be spot welded to the mitered joints. Spot welding of these reinforcements followed by soldering gives the best results. However, when spot welding equipment is not available, a fairly good joint can be made by using straps and gussets sweated on the stainless without reinforcing.

Kitchen cabinets, sinks, beer coolers and many other articles having soldered joints would be unsightly or would appear to be crudely made if the excess solder at the joints were not cleaned off. The solder, being comparatively soft, can be scraped off the stainless. It is preferable to use a stainless steel tool for this job. If a steel tool is used, some of the steel can be very easily imbedded into the stainless and subsequent moisture will corrode this foreign material, with the result that the stainless will discolor in these areas. The stainless tool should be somewhat softer or of the same hardness so that it will not tend to damage the polished surface by scratching.



A finished solder joint—strong, smooth, with no excess solder and easily polished.

Silver Brazing

Stainless steel also can be silver brazed or silver soldered, as it is sometimes called, but due to the higher heat and special fixtures required to hold the work, it is much more desirable to weld. It will also be found that practically the same set-ups and precautionary measures to eliminate warpage are needed for silver soldering as those used for welding, hence, welding should be used whenever possible. Welds can be refinished to a color similar to the sheet, whereas silver brazing alloys suitable for stainless steels will not match. Such alloys contain copper and silver in varying percentages and will change color in the atmosphere and more so in other corrosive conditions.

It often is necessary, however, to join a copper or bronze fitting to a stainless article, and an ordinary solder bond does not have sufficient strength. In such applications silver soldering has no equal. Stainless steels now are being joined permanently and economically by silver soldering alloys. This has been made commercially practical by the recent development of a low temperature alloy and flux. The silver solder "Easy-Flo" when used with "Handy Flux" produces strong, ductile joints at 1200° F. It stands up under:

Heavy Shock—Work which has been done with stainless steels indicate that very strong joints can be made at 1200° F. Tensile strengths range from 40,000 to 60,000 lbs. per sq. in. and in some cases even higher.

Constant Vibration—In addition to strength, this alloy offers high ductility and withstands continued vibration without fatigue or joint failure.

Wide Temperature Changes—High ductility and strength also provides the needed qualities so essential in equipment where temperature changes are involved. Refrigerators offer a good example.

Corrosion Resistance

Due to the silver content in this alloy, it offers excellent resistance to many types of corrosion. Where conditions are severe, caution is advised and tests are suggested before joints are made. This alloy and flux work equally well with both ferrous and non-ferrous metals and alloys. Therefore, stainless steel may be joined to itself, to other steels or to any of the non-ferrous metals and alloys, where a 1200° F. brazing temperature can be used. This is the lowest melting point yet developed for any brazing alloy giving a high degree of strength and ductility. Stainless steel as well as other alloys, when raised to this heat for a brief period of time, can be joined permanently and the detrimental effects of higher temperatures on physical qualities can be avoided. In a properly made joint, only a thin film of brazing alloy is required to obtain high strength. The flux dissolves chromium oxides as well as many other oxides rapidly and thoroughly, and the brazing alloy which flows very freely at 1175° F. penetrates into the joint and alloys the metals to be joined, making sound, gas tight and liquid tight joints.

The application of this brazing alloy and flux is simple. There are a few first principles which, if carefully followed, will consistently give excellent results.

Cleaning

Clean metal surfaces are essential to the proper flow of the brazing alloy. It is, therefore, important to clean off mechanically all dirt, grease or surface oxidation from the surfaces to be joined. It is

(Continued on page 98)

The Revised Gravity and Mechanical Warm Air Heating Code of Toledo, Ohio

In 1937 we published the heating and licensing ordinance of Toledo. That code covered gravity installation only. Last year the old code was amended to include mechanical heating. H. C. Bitter, Secretary of the Toledo Sheet Metal and Roofing Contractors Ass'n explains how the change was made—"A clause in our original ordinance which said 'The Board shall advise rules and regulations governing the practice and business of Warm Air Heating as may be necessary to carry out this ordinance' enabled us to "include Rules' to cover mechanical heating. We had written a mechanical ordinance, had it approved by our Association's committee and the City Board of Warm Air Heating, then took them both apart and rewrote them as 'Rules,' presented the 'Rules' to the City Law Department, the Division of Inspection of Buildings, the Director of Public Safety and to the City Manager. Each of these gave complete approval, and thus, the gravity ordinance became also a mechanical ordinance without the 'usual' opposition, and, without having to go before Council and its Rules and Ordinance Committee."

Warm Air Heating Rules and Regulations

Governing the licensing of Warm Air Heating Contractors and Shops, and, defining the requirements for the installation and inspection of warm air heating systems.

The authority for the issuance of these Rules and Regulations is contained in Ordinance No. 175-37 passed by Council on May 10, 1937.

Recommended by the City Board of Warm Heating, July 28, 1938.

Accepted by the Safety Director of the City of Toledo, October 28, 1938.

Signed,
ARNOLD E. DE FRANCE

Approved by the City Manager of the City of Toledo, November 12, 1938.

Signed,
JOHN N. EDY.

The Section Numbers in Parenthesis are the Sections in Ordinance No. 175-37 upon which the Rules are based.

License

When Required and How Obtained

Section 101. No individual, firm, or corporation shall hereafter establish, maintain, or conduct a warm air heating business in the City of Toledo, nor shall anyone engage in the warm air heating business except as officer, representative, or employee of a Warm Air Heating establishment duly licensed as provided herein, without first having obtained a license to do business as a Warm Air Heating contractor from the Commissioner of Treasury of the City of Toledo, and without having qualified by passing an examination satisfactory to the Board of Warm Air Heating. (Sec. 1).

Application

Re-Examination

Section 102. Every person desiring to be licensed as provided in this ordinance, shall file an application with the Commissioner of Inspection upon a form blank furnished upon request by said Commissioner, verified under oath, setting forth the facts which entitle the applicant to examination and licensure under the provisions of this ordinance. The examination may be taken any time convenient to applicant and the Commissioner of Inspection. The application and examination fee shall be TWO DOLLARS AND FIFTY CENTS ($2.50). Upon failure to pass, each applicant shall have another opportunity to take the examination with fee. After successfully passing the examination, the applicant is entitled to receive a license from the Commissioner of the Treasury entitling him to practice Warm Air Heating in this City. (Sec. 6).

Section 103. A Grade of Seventy per cent (70%) shall be a passing grade for an applicant for a license in Examination based on this ordinance and its requirements. (Sec. 3).

Display of License

Section 105. Every person, firm, and corporation must have a licensed individual in his or its employ, supervising the installation and performance of all warm air heating work. (Sec. 6).

Section 106. The term Warm Air Heating Shops shall be defined as places of business established, equipped, maintained or conducted by an individual, firm, or corporation for the purpose of engaging in and carrying on the work or trade of cleaning, repairing, replacing, remodeling, or installing warm air heating systems for the public generally. (Sec. 5).

Licensing of Branches

Section 107. If a warm air heating contractor shall maintain more than one establishment or shop for the transaction of business, then said contractor shall obtain a license for each such establishment or branch. (Sec. 8).

Renewal

Section 108. If a contractor shall fail to secure a renewal of license within sixty (60) days after the expiration date of his certificate or license, he shall be required to pass examination and pay the regular first year fee as in the original application. (Sec. 8).

License Not Transferable

Section 109. In no case shall the unearned portion of a fee paid be returned to a warm air heating contractor whose license has been revoked or annulled by the Director of Public Safety for any cause as herein and hereafter provided, and in no case shall license be transferable. (Sec. 8).

Hearing of Complaint

Reprimand—Suspension

Section 110. The Director of Public Safety shall hear all complaints on any licensee, and may suspend or revoke the license of any licensee whose conduct has violated any sec-

(*Continued on page 78*)

Advertising Campaign of a Small Town Contractor

LET US
Vacuum Clean Your Furnace
We clean your furnace and chimney thoroughly, removing all the soot and dirt, and check against all fire hazards. A complete job at a reasonable cost.
R. F. Gehrke
Sheet Metal Co.
Shawano
Wisconsin

THAT the small town sheet metal and furnace contractor cannot advertise in local newspapers with any hope of monetary return, is a notion held by a great many people in this industry. Perhaps, if such advertising is thought of in terms of advertisements appearing every day or every week, or is judged in terms of full page space, or it is felt that every advertisement must "stand 'em in line outside the door," newspaper advertising will not pay for itself.

But, on the other hand, perhaps a modest campaign of a few advertisements each year, carefully chosen and slanted according to the time of year or timeliness of

Wishing You a Very
MERRY CHRISTMAS
and a
Healthy, Happy New Year
We wish to take this opportunity to thank all our friends and customers for the favors and courtesies extended to us during the past year, and trust that we may be of still greater service to you in the coming year.
R. F. GEHRKE
SHEET METAL CO.
SHAWANO, WISCONSIN
and Its Employees
ROBERT GEHRKE
HERMAN GEHRKE
ALFRED GOTTSCHALK
JOHN RUNGE
RAYMOND SCHROEDER
ELSIE GEHRKE
MELVIN KNOPE
MYRON WENDT
PAUL GRIESBACH
VERNOL KNOPE
HARLAND OWEN
17 Years of Dependable Sheet Metal and Warm Air Heating Service in This Community.

ENJOY AUTOMATIC CONTROLLED HEAT ALL WINTER
INSTALL A STOKOL
AUTOMATIC STOKER
Stokol Cuts Fuel Bills 10% to 50% — Fires Your Coal Burning Furnace For You — Constant, Uniform Heat
Stokol is easily installed in your present coal burning heating plant, feeds coal automatically and economically. Exclusive patented features assure dependable operation, greater efficiency. When you buy Stokol you buy a quality product that will give years of dependable service. Available in hopper and bin-feed models.
STOKOL EXCLUSIVE FEATURES • Fully Automatic—Thermostatically Controlled • Hydraulic Oil Transmission • No Shear Pins • Airtight Hopper • Safe, Clean, Dependable.
R. F. GEHRKE
SHEET METAL COMPANY

the service offered; and if such advertisements are conservative in size and are not expected to "pull in the whole town," some newspaper advertising will pay for itself in money, or publicity, or good will.

Such, any how, is the feeling of the two brothers who operate the R. F. Gehrke Sheet Metal Company in Shawano, Wisconsin. R. F. Gehrke is widely known throughout his home state, and has long been an active state association member. He was the 1937 and 1938 president of the state association. Herman Gehrke has not been so much in the public eye, but he, too, is a good association member and, handling primarily the shop and office routine, has given most time to the problems of advertising. R. F. Gehrke started the business in 1921.

The Gehrke program was launched in a very modest way in 1928 when a furnace cleaning advertisement announced the service. During all the ten years since, some advertising has been carried on. Some years the total volume of space used has been quite small, in better years larger space and more frequent insertions have been bought. During the same ten years some

HAVE YOU A FURNACE-PIPE HEATING SYSTEM?

YOU'RE LUCKY! YOU CAN BE COMFORTABLE THIS SUMMER

There is no need to suffer with the heat this summer for with no changes in your heating system and at no added expense, FURBLO offers you the wonderful advantage of a cooling system for summer use. Simply start FURBLO without a fire in the furnace and it circulates air gently through every room. No drafts, No summer colds. Just pleasant relief from stuffiness.

It also increases the winter efficiency of your furnace, and sending abundant heat instantly to every corner of every room; and at no extra cost will provide a full measure of comfort the year 'round.

It cleans the air, too. Rids the air of winter grime or summer dust—cuts out cleaning drudgery — makes the air you breathe fit to breathe.

Now is the time to investigate the FURBLO air conditioner. It costs so little to install—it costs so little to operate. Yet it gives you so much comfort winter or summer.

THERE ARE SIZES TO PERFECTLY FIT YOUR HOME AND YOUR FURNACE

SEE THE FURBLO AIR CONDITIONER IN OUR BOOTH AT THE HOME SHOW

GEHRKE'S

SHEET METAL COMPANY

ROOF LEAKS?

Don't get a bucket...GET A GOOD ROOFING CONTRACTOR

It is expensive and wasteful to neglect your roof. Have it inspected by an expert, *know* that it is in good condition. The safety of your equipment and even of your very building depends on it. Our many years of experience qualifies us to do this for you and there is not the slightest obligation. We can quickly determine if there is a weak flashing—or if the felts have begun to dry out from constant exposure to the sun. *A few repairs now may save you a big bill later.* You have the added assurance of a first class job because we use Johns-Manville quality roofing materials. Call us *now* for a free roof inspection.

SEND FOR FREE BOOK

Send FREE copy of J-M book which shows how to cut the cost of roof maintenance—tells where roof troubles start, how to prevent them.

NAME .....

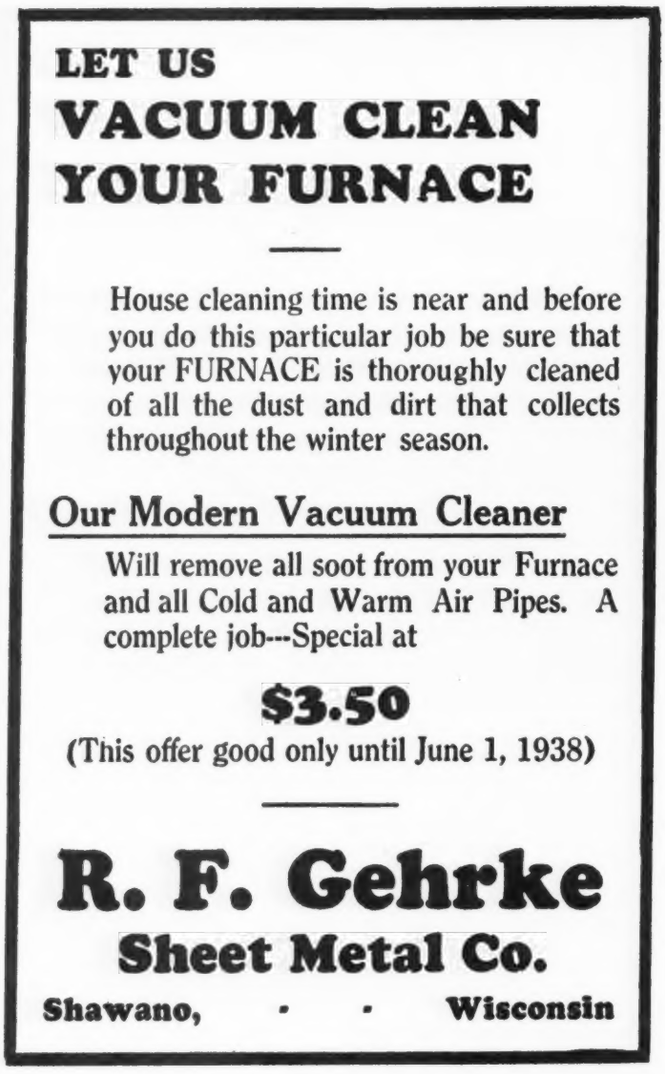
ADDRESS .....

CITY .....

R. F. GEHRKE SHEET METAL CO.

Shawano, Wis. Phone 187-J

APPROVED JOHNS-MANVILLE BUILT-UP ROOFING CONTRACTOR JM JOHNS-MANVILLE PRODUCTS


LET US
VACUUM CLEAN
YOUR FURNACE
House cleaning time is near and before you do this particular job be sure that your FURNACE is thoroughly cleaned of all the dust and dirt that collects throughout the winter season.
Our Modern Vacuum Cleaner
Will remove all soot from your Furnace and all Cold and Warm Air Pipes. A complete job---Special at
$3.50
(This offer good only until June 1, 1938)
R. F. Gehrke
Sheet Metal Co.
Shawano, • • Wisconsin

experimenting has been done with different services which the firm can advertise. Also, there is available a daily paper and a weekly paper so a choice or both as they serve best had to be decided upon. During the last two years both papers have been used and during most of 1938 one advertisement was bought each week in each paper. This means a Gehrke advertisement in most issues of the Leader (weekly) and one advertisement a week in the Journal (daily).

The campaign carried on is not elaborate. Some of the advertisements are complete insertions furnished in mat form by one of the manufacturers of equipment handled by Gehrke, some ads are made up of cuts from the manufacturers and reading matter written by the firm. Still others are completely written and laid out by one or both firm members. Several typical advertisements used during 1937 and 1938 are shown and readers probably can choose the different types of advertisements mentioned.

Not a "Dead-line" Program

No attempt is made to make this advertising program a wearisome task, with advertisements having to be written at the last moment or waiting to be written as soon as a good idea strikes the firm. Nor is any attempt made to change copy so frequently that there is always some writing waiting to be done.

Instead, the firm lets going advertising run along, always changing as the seasons change or as new services are timely and if some special occasion calls for a special advertisement, or something brand new should be publicised, copy is prepared.

Since the firm does a variety of work, any one year's range of ads covers several subjects. General sheet metal work and roofing have been found timely in the spring and summer and fall and occasionally during the winter, depending upon the weather. Stokers are emphasized in the late summer, fall and into the winter. Incidentally, the firm has sold stokers for two years and finds the market growing slowly. Furnace cleaning ads appear in the spring and fall and for ten years have shown a very good return. Blower systems are becoming more popular each year with approximately one-third of all furnaces sold in 1937 and 1938 being mechanical circulation. In addition, several blowers are sold each year for attachment to existing furnaces. Blower advertisements run in the fall and winter.

Once a year, at Christmas time, the firm buys space for a Christmas greeting. In that advertisement all the persons working for the firm in that year are named (as shown on one ad published).

In the estimation of both brothers, this modest advertising campaign has amply paid for all money spent, by keeping the firm name before prospective and old customers and by making known the various services the firm is prepared to offer. Since customers frequently get an idea to improve homes or property or to buy one of the conveniences such as a blower or stoker, the fact that Gehrke handles these items or does that particular type of work bears repetition and on this assumption the campaign is based.

N. W. A. Publicity

(Continued from page 42)

direct mail (sales letters and folders and so on). The chances are you need both.

Another basic principle you shouldn't forget is: don't sell what it is; sell what it does—not furnaces or fans or humidifiers or air conditioning equipment, but smart appearance, savings in space, in toil and trouble and in fuel; and above all, home health and comfort all the year around.

One of the neatest ideas is to watch the local newspapers for some of the items that appear as a result of the national publicity distributed by the National Warm Air Heating and Air Conditioning Association, clip them out and mail them to some of your best prospects, with a brief, informal note saying: "Did you see this? Could I tell you some more about the way these new furnaces work?"—or something like that.

The long and short of it all is: this spring of 1939 ought to see more warm air furnaces sold, more old furnace installations modernized and more summer cooling and air conditioning equipment installed in the United States than in any previous year in history.

RESIDENTIAL AIR CONDITIONING SECTION

A GREAT many suggestions have been made from time to time for setting up filter cleaning and replacement services to give the user the satisfactory operation he should expect. In Salt Lake City such a filter cleaning service has been in successful operation for some time with several hundred users. Details of the plan are related on page 70.

Two articles in this section relate to stokers—the concluding report of the Research Residence on stoker-furnace tests (very important) on page 56 and a sales plan to sell stokers using old customers on page 64. The sales program is unusually interesting because of the area covered and the advertising employed.

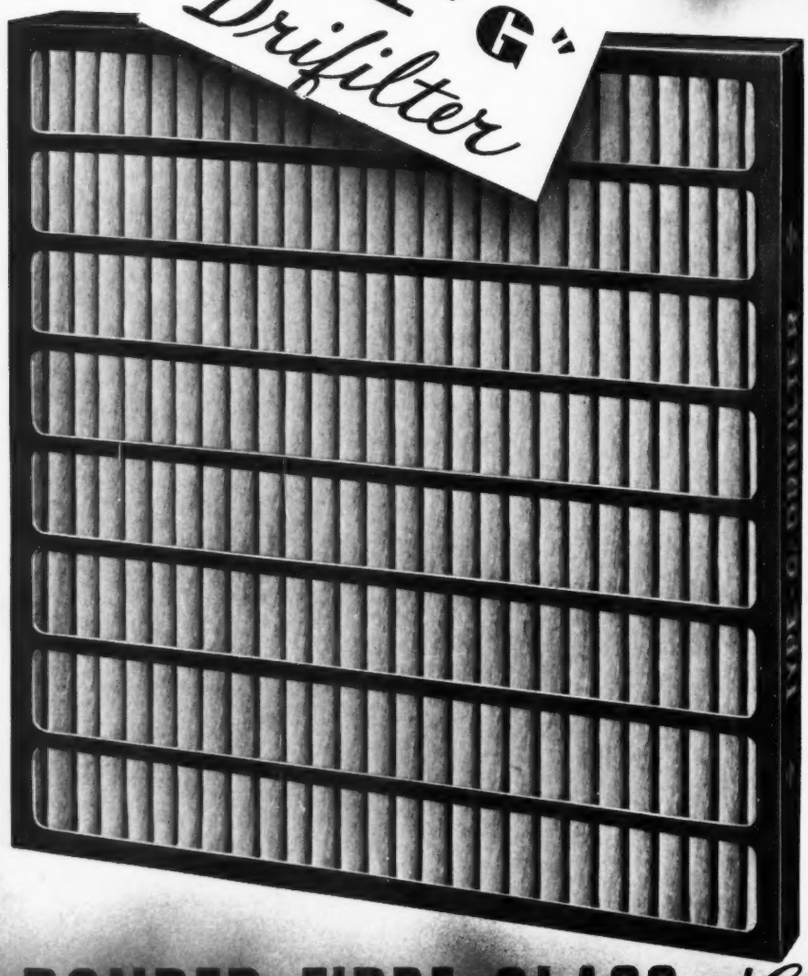
G. A. Voorhees is working on the last three sections of Precalculated Engineering. In concluding his series he plans to set up a typical problem and show the step-by-step method from previously published tables. We expect the next article in April.

ANNOUNCING

The

TYPE "G"

Drifilter



With BONDED FIBRE GLASS *Element*

The Type G Drifilter is an inexpensive replaceable filter, in which the new bonded fibre glass material that has proved so satisfactory in American Airmat filters and Dust Arresters, is used as a filter medium.

The outstanding advantages of the Type G medium, in addition to its being odorless, flame-proof, and cleanable, is its high efficiency in dust removal, large dust-holding capacity and low resistance to air flow.

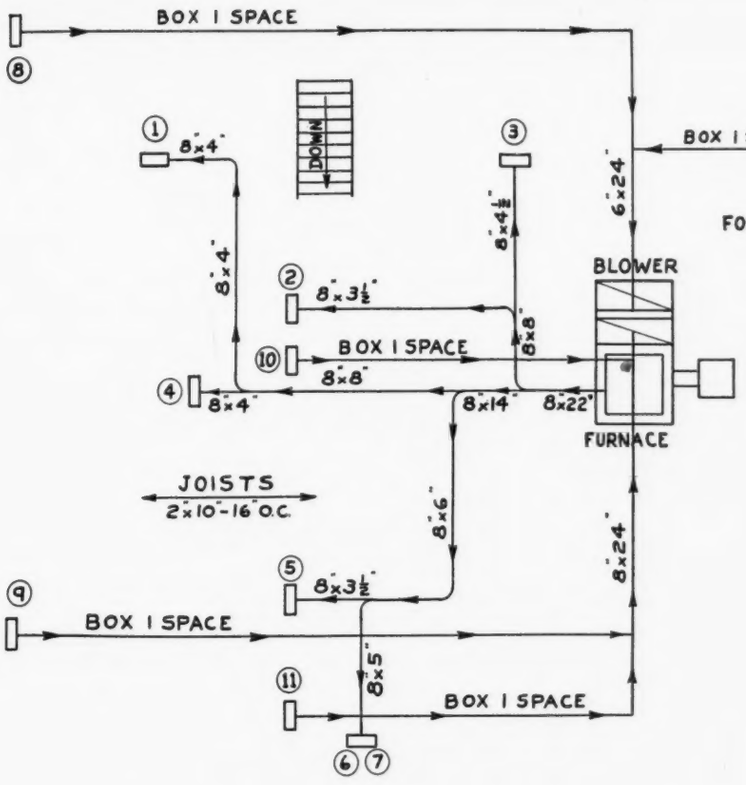
The Type G Drifilter can be cleaned several times by rapping out the dry dust accumulation, before it will need to be replaced.

Write Dept. 103 for complete information.

AMERICAN AIR FILTER CO., INC.
INCORPORATED
LOUISVILLE, KENTUCKY
In Canada: Darling Bros., Ltd., Montreal, P. Q.

The Symbol of Clean Air

DUST CONTROL **AAF** AIR FILTRATION



FORCED AIR HEATING LAYOUT

WARM AIR		
Nº	LOCATION	C.F.M.
1	REAR BED ROOM	120
2	LIVING ROOM & HALL	97
3	KITCHEN	133
4	FRONT BED ROOM	116
5	BATH	33
6&7	LIVING ROOM & VEST. (& HALL)	158
		657

RETURN AIR		
Nº	LOCATION	C.F.M.
8	REAR BED ROOM	186
12	LIVING ROOM	81
		267
9	FRONT BED ROOM	390
11	LIVING ROOM	
10	HALL	
		657

Velocity Method for Sizing Ducts

with Capacity Tables Based on the Technical Code

By Alfred R. Wagstaff

Engineer, Sioux City Fdy. and Boiler Co.,
Sioux City, Iowa

ANY correct method of sizing ducts takes all the factors into consideration as set forth in the Technical Code, which has been widely publicized by the technical magazines and accepted by heating engineers. To follow the code takes considerable time on each layout and not all men have the time required to figure by this method, especially during the busy season. For this reason the velocity method of sizing ducts can be used successfully, as it is simple and easy and does not require much time.

The velocity method does not make allowance for equalizing the friction pressure losses in the various branches by changing the sizes of the ducts, but relies on dampers, which should be installed in every run to equalize this loss.

It is seldom that we find a blower that has the exact output required for heating a home. Suppose the required cfm is 980 and the blower has a rated capacity of 1225. If we had a way to test and set the blower we can get 980 cfm, but few shops are so equipped. The blower is installed and the electricity turned on. Then the 245 cfm in excess of the requirement is either allowed to go through the ducts, carrying more air at a lower temperature than the design called for, or the static pressure is raised with dampers so that the fan delivery into the ducts is according to design. If a system was designed down to the last cfm, technically, and the blower is not taken care of before being installed, we will still have to take care of the pressure by dampering.

The velocity method removes this problem. The average furnace man can comprehend this method when he will not begin to understand the technical code, the friction method and others. And after all, it is not the large concerns with the engineers that are doing the bulk of the jobs in the homes, it is the small man, and that is the man who has to handle nearly everything himself.

The one big drawback to prefabricated ducts is that sections generally are made in one depth only, necessitating excess widths at the take off from the plenum chamber, causing unnecessary heat loss in the ducts and friction.

In designing duct systems we do not make the width more than four times the height. This can not be controlled in ducts ready made. After the required area is found for the takeoff from the plenum chamber, the ducts are so sized that the width does not exceed four times the depth. For this reason the "Precalculated Capacities of Ducts for Various Velocities" was prepared for several depths.

To show the adaptability of these tables, a job has been selected at random from the files and will serve for this explanation, together with a rough layout of the system.

After computing the heat loss the data sheet showed the following for 140° F. register temperature:

Vestibule	61 cfm
Living Room	163
Hall	31
Bath	33
Front Bed Room	116
Rear Bed Room	120
Kitchen	133
	657 cfm required

This installation having highwall registers, a velocity of 600 fpm was selected and the stacks sized accordingly, being drawn in roughly and numbered as follows

1 Rear Bed Room	120 cfm
2 Living Room & Hall	97 (81 + 16)
3 Kitchen	133
4 Front Bed Room	116
5 Bath	33
6 & 7 Living Room, Vest. & Hall	158 (82 + 15 + 61)
	657

The furnace and blower were located on the lay-

Table 1

CARRYING CAPACITIES OF DUCT 8 INCHES DEEP FOR VARIOUS WIDTHS AND VELOCITIES

WIDTH OF DUCT	ROUND PIPE SIZE	AREA	VELOCITY-FEET PER MINUTE							WIDTH OF DUCT	ROUND PIPE SIZE	AREA	VELOCITY-FEET PER MINUTE						
			300	350	400	500	600	800	1000				300	350	400	500	600	800	1000
INCHES			CUBIC FEET PER MINUTE							INCHES			CUBIC FEET PER MINUTE						
2½	4.7	17.3	36	42	48	60	72	96	120	21	13.9	151.7	316	369	421	527	632	843	1054
3	5.2	21.2	44	52	59	74	88	118	147	22	14.2	158.4	330	385	440	550	660	880	1100
3½	5.7	25.5	53	62	71	89	106	142	177	23	14.5	165.1	344	401	459	573	688	917	1147
4	6.1	29.2	61	71	81	101	122	162	203	24	14.8	172.0	358	418	478	597	717	956	1195
4½	6.5	33.2	69	81	92	115	138	184	230	25	15.1	179.1	373	435	498	622	746	995	1244
5	6.9	37.4	78	91	104	130	156	208	259	26	15.4	186.3	388	453	518	647	776	1035	1294
6	7.6	45.4	95	110	126	158	189	252	315	27	15.6	191.1	398	464	531	663	796	1062	1327
7	8.2	52.8	110	128	147	183	220	293	367	28	15.9	198.6	414	483	552	690	828	1103	1379
8	8.8	60.8	127	148	169	211	253	338	422	29	16.1	203.6	424	495	566	707	848	1131	1414
8½	9.1	65.0	135	158	181	226	271	361	451	30	16.4	211.2	440	513	587	733	880	1173	1467
9	9.3	67.9	141	165	189	236	283	377	472	31	16.6	216.4	451	526	601	751	902	1202	1503
9½	9.6	72.4	151	176	201	251	302	402	503	32	16.9	224.3	467	545	623	779	935	1246	1558
10	9.8	75.4	157	183	209	262	314	419	524	33	17.1	229.7	479	558	638	798	957	1276	1595
10½	10.0	78.5	164	191	218	273	327	436	545	34	17.3	235.1	490	571	653	816	980	1306	1633
11	10.2	81.7	170	199	227	284	340	454	567	35	17.5	240.5	501	584	668	835	1002	1336	1670
11½	10.5	86.6	180	210	241	301	361	481	601	36	17.7	246.1	513	598	684	854	1025	1367	1709
12	10.7	89.9	187	218	250	312	375	499	624	37	17.9	251.6	524	611	699	874	1048	1398	1747
12½	10.9	93.3	194	227	259	324	389	518	648	38	18.2	260.2	542	632	723	903	1084	1446	1807
13	11.1	96.8	202	235	269	336	403	538	672	39	18.4	265.9	554	646	739	923	1108	1477	1847
13½	11.3	100.3	209	244	279	348	418	557	697	40	18.6	271.7	566	660	755	943	1132	1510	1887
14	11.5	103.9	216	252	289	361	433	577	722	41	18.8	277.6	578	675	771	964	1157	1542	1928
14½	11.7	107.5	224	261	299	373	448	597	747	42	19.0	283.5	591	689	788	984	1181	1575	1969
15	11.9	111.2	232	270	309	386	463	618	772	43	19.2	289.5	603	703	804	1005	1206	1608	2010
15½	12.1	115.0	240	279	319	399	479	639	799	44	19.4	295.6	616	718	821	1026	1232	1642	2053
16	12.3	118.8	247	289	330	412	495	660	825	45	19.6	301.7	629	733	838	1048	1257	1676	2095
17	12.6	124.7	260	303	346	433	520	693	866	46	19.8	307.9	641	748	855	1069	1283	1711	2138
18	13.0	132.7	276	322	369	461	553	737	922	47	19.9	311.0	648	756	864	1080	1296	1728	2160
19	13.3	138.9	289	338	386	482	579	772	965	48	20.1	317.3	661	771	881	1102	1322	1763	2204
20	13.6	145.3	303	353	404	504	605	807	1009	49	20.2	320.5	668	779	890	1113	1336	1781	2226

Table 2

CARRYING CAPACITIES OF RECTANGULAR DUCTS AND ROUND PIPES OF EQUAL FRICTION — DEPTH 10 IN.

WIDTH	FREE AREA	ROUND PIPE DIA.	VELOCITY - FEET PER MINUTE							
			300	350	400	500	600	700	800	1000
INCHES			CUBIC FEET PER MINUTE							
2½	21.2	5.2	44	52	59	74	88	103	118	147
3	26.4	5.8	55	64	73	92	110	128	147	183
3½	31.2	6.3	65	76	87	108	130	152	173	216
4	36.3	6.8	76	88	101	126	151	176	202	251
4½	40.7	7.2	85	99	113	141	170	198	226	283
5	46.6	7.7	97	113	129	162	194	227	259	324
6	55.4	8.4	115	135	154	192	231	269	308	385
7	66.5	9.2	139	162	185	231	277	323	369	462
8	75.4	9.8	157	183	209	262	314	367	419	524
9	84.9	10.4	177	206	236	295	354	413	472	590
10	95.0	11.0	198	231	264	330	396	462	528	660
11	103.9	11.5	216	252	289	361	433	505	577	722
12	113.1	12.0	236	275	314	393	471	550	628	785
13	122.7	12.5	256	298	341	426	511	596	682	852
14	130.7	12.9	272	318	363	454	545	635	726	908
15	141.0	13.4	294	343	392	490	588	685	783	979
16	149.6	13.8	312	364	416	519	623	727	831	1039
17	158.4	14.2	330	385	440	550	660	770	880	1100
18	167.4	14.6	349	407	465	581	698	814	930	1163
19	176.7	15.0	368	429	491	614	736	859	982	1227
20	186.3	15.4	388	453	518	647	776	906	1035	1294
21	193.6	15.7	403	470	538	672	807	941	1076	1345
22	203.6	16.1	424	495	566	707	848	990	1131	1414
23	211.2	16.4	440	513	587	733	880	1027	1173	1467
24	221.7	16.8	462	539	616	770	924	1078	1232	1540
25	227.0	17.0	473	552	631	788	946	1103	1261	1577
26	235.1	17.3	490	571	653	816	980	1143	1306	1633
27	243.3	17.6	507	591	676	845	1014	1183	1352	1690
28	254.5	18.0	530	618	707	884	1061	1237	1414	1768
29	260.2	18.2	542	632	723	903	1084	1265	1446	1807
30	268.8	18.5	560	653	747	933	1120	1307	1493	1867
31	277.6	18.8	578	675	771	964	1157	1349	1542	1928
32	286.5	19.1	597	696	796	995	1194	1393	1592	1990
33	292.6	19.3	610	711	813	1016	1219	1422	1626	2032
34	301.7	19.6	629	733	838	1048	1257	1467	1676	2095
35	307.9	19.8	641	748	855	1069	1283	1497	1711	2138
36	317.3	20.1	661	771	881	1102	1322	1542	1763	2204
37	323.7	20.3	674	787	899	1124	1349	1574	1798	2248
38	333.3	20.6	694	810	926	1157	1389	1620	1852	2315
39	339.8	20.8	708	826	944	1180	1416	1652	1888	2360
40	349.7	21.1	729	850	971	1214	1457	1700	1943	2429
41	356.3	21.3	742	866	990	1237	1485	1732	1980	2475
42	366.4	21.6	763	890	1018	1272	1527	1781	2036	2545
43	373.3	21.8	777	907	1037	1296	1556	1815	2074	2593
44	380.1	22.0	792	924	1056	1320	1584	1848	2112	2640
45	387.1	22.2	806	941	1075	1344	1613	1882	2151	2688
46	394.1	22.4	821	958	1095	1368	1642	1916	2190	2737
47	401.2	22.6	836	975	1115	1393	1671	1950	2229	2786
48	408.3	22.8	851	992	1134	1418	1701	1985	2269	2836
49	415.5	23.0	866	1010	1154	1443	1731	2020	2309	2886
50	422.7	23.2	881	1027	1174	1468	1761	2055	2349	2936
51	430.1	23.4	896	1045	1195	1493	1792	2091	2390	2987
52	437.4	23.6	911	1063	1215	1519	1822	2126	2430	3038
53	444.9	23.8	927	1081	1236	1545	1853	2163	2472	3090
54	452.4	24.0	942	1099	1257	1571	1885	2199	2514	3142
55	460.0	24.2	958	1118	1278	1597	1917	2236	2556	3195

out and a depth of 8 inches for the trunk line was decided on because of the shallow basement. The ducts were then sized from the table of carrying capacities for a duct 8 inches deep (Table 1) (showing how easy it is to use) starting with the branch

No. 1	120 cfm
4	116 cfm
	236 cfm

Referring to Table 1 and glancing down the 600 fpm column we find 122 cfm for a 4-in. width and so we fill out the first at 8 x 4. As 116 falls between 106 for 8 x 3½ and 122 for 8 x 4 we use the 8 x 4 for the second. The total of 236 cfm in the 600 fpm column falls between 220 for 8 x 7 and 253 for 8 x 8 so we use 8 x 8 for the branch size, which gives us the first branch as

No. 1	120	— 8 x 4
4	116	— 8 x 4
	236	— 8 x 8

We then size No. 5 at 8 x 3, and the combination riser No. 6 & 7 at 8 x 5. This branch then shows

No. 5	33 cfm	— 8 x 3
6 & 7	158	— 8 x 5
	191	— 8 x 6

and the total of the two branches

236 cfm	8 x 8
191	8 x 6
427 cfm	8 x 14

Sizing the other branch we get

No. 3	133 cfm	— 8 x 4½
2	97	8 x 3½
	230 cfm	— 8 x 8
add. other branches	427 cfm	8 x 14
	657 cfm	— 8 x 22

or a total of 657 cfm which shows as 8 x 22-in. for the main trunk from Table 1, all sizes being taken from the table in a few minutes.

The return air ducts are sized in the same manner:

No. 8 Rear Bed Room	Living Room	81
12 Living Room	Rear Bed Room..	120
	Kitchen	66
		267

The 267 cfm at 325 fpm requires a duct 6 x 24.

No. 9 Front Bed Room	}	Vestibule	61
11 Living Room	}	Living Room	82
10 Hall	}	Hall	31
390 cfm		Bath	33
267 cfm		Front Bed Room..	116
—		Kitchen	67
657 cfm		—	
		cfm	390

The 390 cfm at 325 fpm requires a duct 8 x 24, and the total of the two, 657 is the delivery requirements, so that as much air is being returned to the blower as it delivers.

In order to keep the widths of both return ducts the same the 6-in. chart showed 267 cfm at 325 fpm for 6 x 24, and the 8-in. chart 390 cfm at 325 fpm for 8 x 24. The 325 fpm is found by allocation—8 x 24 at 300 shows 358 and at 350 shows 418 or a difference of 60 cfm. Dividing this by 2 and adding one-half to the 358 we get 358 plus 30 or 388 which is close to the 390 required and shows our return air at 325 fpm.

To obtain capacities for velocities not shown on the chart—for 200 fpm take half of the 400 fpm; for 250 take half of the 500 fpm.

A master chart has been prepared from which any other velocity can be included instead of the ones on the chart.

These tables have been prepared for depths of 6 in., 7 in., 8 in., 9 in., 10 in., 12 in. and 14 in. and are in accordance with the third Edition of the Mechanical Code, table 5 and 6, and the Technical Code, page 33.

For those who figure from round pipe sizes—these sizes are shown and capacities obtained from the table.

These tables can also be used for ventilation work and air conditioning as well as warm air heating—any place that air is moved mechanically in ducts.

This method has been sucessfully used in homes to 225,000 Btu heat loss and requiring 2800 to 3000 cfm with only a few damper adjustments.

[Editor's Note—The author has calculated tables, similar to the two shown, for ducts 6, 7, 9, 12 and 14 inches deep. These can be published if enough readers are interested. Please signify your wishes.]

Performance of Stoker-Fired and Hand-Fired Warm-Air Furnaces in the Research Residence‡

By A. P. Kratz,* S. Konzo,** and R. B. Engdahl,*** (MEMBERS) Urbana, Ill.

Part 1 of this report on stoker firing in the Research Residence was published in the February issue. Part 2, which concludes the report, begins on the facing page. As pointed out in Part 1 and emphasized in Part 2, there is more to satisfactory stoker operation than the simple application of the stoker in the ash pit of the furnace. This report brings out emphatically the importance of keeping the over-fire slot in the feed door closed; the necessity of an adequate control system; the need for watching fly ash; and the relationship of the off-period fuel consumption to total fuel consumption. Since this report covers a heating system tested under a combination stoker and furnace, and not furnace or stoker individually, the conclusions are especially important.

Consumption of Fuel

Since small deviations occurred in the heating value of the different lots of coal used, the actual weight of coal fired in the stoker-fired plants was corrected to equivalent weight of coal, having a heating value of 13,040 Btu per pound, and the corrected weights were plotted in the curves for fuel consumption shown in Fig. 9. It may be observed from these curves that the weight of coal burned in the hand-fired plant (curve No. 1) was less than that burned in the stoker-fired plant in which the over-fire damper was wide open (curve No. 2), but was greater than that burned in the stoker-fired plant in which the over-fire damper was closed (curve No. 3). The values in Table 4, selected from

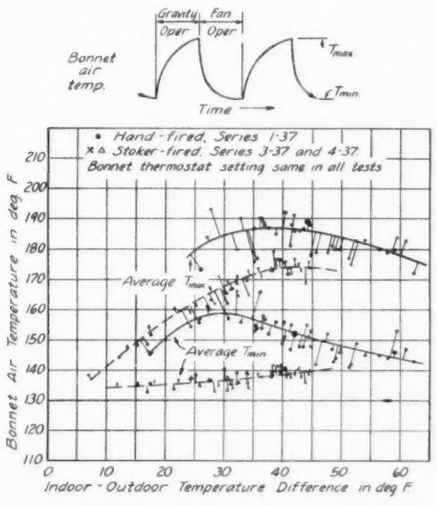


Fig. 8—Operating range of bonnet air temperatures. Research Residence data. Cast, circular radiator, 27-in. furnace. Season 1937-38, Series 1-37, 3-37 and 4-37

Fig. 9, for an indoor-outdoor temperature difference of 34 F, show that the weights of coal burned per day were 138 lb for the hand-fired plant, 154 lb for the stoker-fired plant with over-fire damper open, and 128 lb for the stoker-fired plant with over-fire damper closed. Under local conditions a price differential of approximately $1.25 per ton existed in favor of the coal used for the stoker-fired plant.

In the case of the hand-fired plant the fuel was burned comparatively uniformly, as indicated by the records for CO_2 and flue gas temperatures shown in Fig. 3. On the other hand, in both of the stoker-fired plants the evolution of heat was not as uniform as that for the hand-fired plant, as indicated by the records shown in Figs. 4 and 5. Furthermore, the burning that occurred during the off-periods of stoker operation was accompanied by a lower CO_2 content of the flue gas, particularly when the over-fire damper was open.

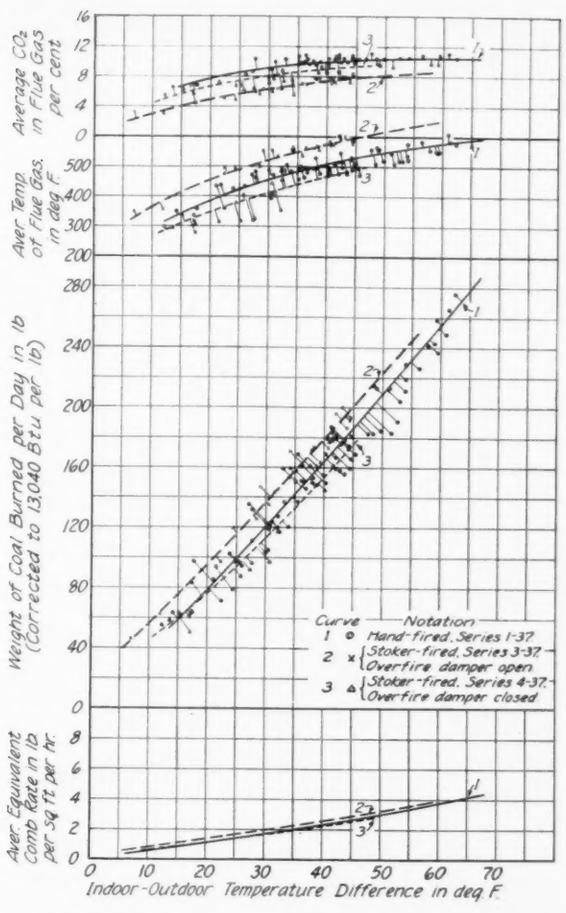

Average CO2 in Flue Gas per cent
Aver. Temp. of Flue Gas, in deg F
Weight of Coal Burned per Day in lb (Corrected to 13,040 Btu per lb)
Aver. Equivalent Comb. Rate in lb per Sq Ft per Hr.
Curve Notation
1 Hand-fired, Series 1-37
2 Stoker-fired, Series 3-37 Overfire damper open
3 Stoker-fired, Series 4-37 Overfire damper closed
Indoor-Outdoor Temperature Difference in deg F

Fig. 9—Performance curves for hand-fired and stoker-fired furnaces. Research Residence tests. Cast, circular radiator, 27-in. furnace. Season 1937-38, Series 1-37, 3-37 and 4-37

Table 4—Combustion Characteristics[a] of Three Methods of Firing

Firing Method	Curve No. in Fig. 9	Weight of Coal Burned, Lb Per Day	Average[b] CO_2 in Flue Gas, Per Cent	Average[b] Temp. of Flue Gas, Deg F
Hand Firing, Over-fire damper open...	1	138	9.6	480
Stoker Firing, Over-fire damper open...	2	154	6.8	545
Stoker Firing, Over-fire damper closed..	3	128	8.6	440

[a] Values selected from the performance curves in Fig. 9 for an indoor-outdoor temperature difference of 34 F.
[b] Values are average of those obtained during both the on-periods and off-periods of stoker operation.

By proper adjustment of the air supply to the fuel bed during the periods of stoker operation, excellent conditions of combustion could be maintained. During the off-periods of the stoker, however, the fuel remaining in the fuel bed burned with the air supplied through the fuel bed by means of the existing natural draft and with the air supplied over the fuel bed through openings in the feed door. If a large amount of air were supplied from these two sources during the off-periods of the stoker, the amount of coal burned during the off-period would be large.

In the case of the hand-fired plant, the fuel bed contained a large amount of partly coked fuel which con-

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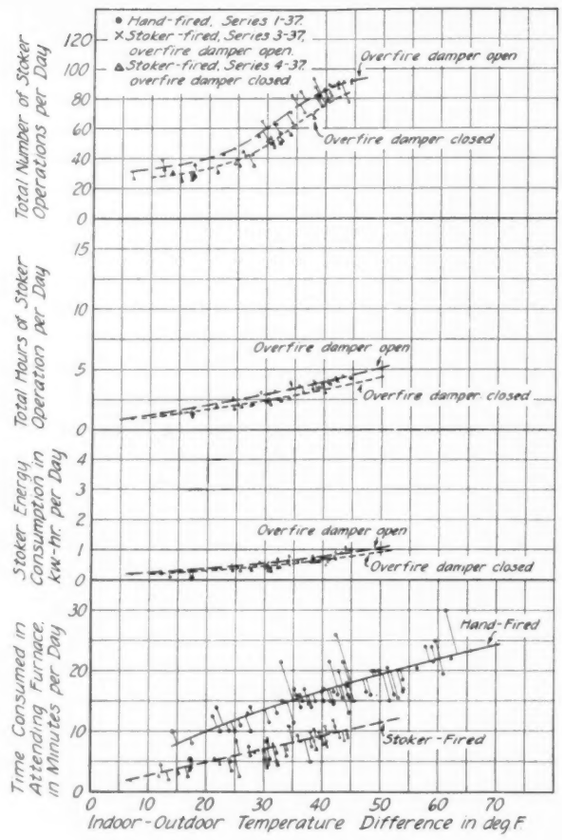

• Hand-fired, Series 1-37.
× Stoker-fired, Series 3-37, overfire damper open.
▲ Stoker-fired, Series 4-37, overfire damper closed
Overfire damper open
Overfire damper closed
Total Number of Stoker Operations per Day
Total Hours of Stoker Operation per Day
Stoker Energy Consumption in Kw-hr. per Day
Time Consumed in Attending Furnace, in Minutes per Day
Hand-Fired
Stoker-Fired
Indoor-Outdoor Temperature Difference in deg F

Fig. 10—Operating characteristics of stoker and furnace. Research Residence tests. Cast, circular radiator, 27-in. furnace. Season of 1937-38, Series 1-37, 3-37 and 4-37

tinued to evolve combustible gases during the off-period. These gases required a comparatively large amount of air for combustion, and the amount supplied by the over-fire damper was sufficient to promote good combustion of the gases, but did not result in a great amount of combustion of the fuel at the surface of the fuel bed. In the case of the stoker, the fuel remaining at the end of the operating period was well coked, and only a small amount of combustible gas was evolved during the off-period. Hence, with the over-fire damper open a considerably greater amount of air than that required for the combustion of the gases was drawn in, resulting in lower CO_2 content than that shown for the hand-fired plant. At the same time, however, the combustion of the fuel at the surface of the fuel bed was promoted and the evolution of heat from this source, together with the reduced heat transfer caused by the greater mass of air present, resulted in higher flue gas temperatures than those shown for the hand-fired plant.

When the over-fire damper was closed in the stoker-fired plant, the excess air was reduced, resulting in materially higher CO_2 values than those given by the same plant with the over-fire damper open. At the same time the restricted combustion at the surface of the fuel bed resulted in flue gas temperatures much lower than those obtained with the over-fire damper open in the same plant, and somewhat lower than those obtained in the hand-fired plant. The amount of leakage, however, was apparently sufficient, with the small amount of combustible gases evolved, to give more excess air than that obtained in the hand-fired plant, as evidenced by the lower CO_2 obtained in this case than that obtained in the hand-fired plant.

Since the total time of stoker operation per day, as indicated in the second group of curves from the top of Fig. 10, was ordinarily less than five hours, the off-period burning constituted an important part of the entire burning process. The result was that high or low CO_2 contents and temperatures of the flue gas occurring during these off-periods were reflected in corresponding high or low average CO_2 contents and flue gas temperatures as shown in Table 4. Since the flue gas loss is influenced by the combination of CO_2 content and temperature of the flue gas, the higher fuel consumption of the stoker-fired furnace with the over-fire damper open, as compared with that of the hand-fired furnace, is consistent with the lower CO_2 content and higher flue gas temperature shown in Table 4. Also, the lower fuel consumption of the stoker-fired furnace with the over-fire damper closed, as compared with that of the hand-fired plant, is consistent with the slightly lower CO_2 content and the lower temperature of the flue gas shown in this case. This reduction in fuel consumption, however, was accompanied by the production of some smoke and soot, a discussion of which will be presented in a later section.

Operation of the Stoker

The number of stoker operations, the total hours of stoker operation, and the electrical energy consumption of the stoker motor per day are shown in Fig. 10. In each case the values obtained with the over-fire damper open were slightly greater than those obtained with the over-fire damper closed. For an indoor-outdoor temperature difference of 34 F the electrical energy consumption of the stoker motor was 0.6 kwhr per day with the over-fire damper open and 0.5 kwhr per day with it closed. The electrical energy consumption of the stoker motor per ton of coal fired was 7.8 kwhr for both methods of stoker operation. It is probable that with smaller rates of coal input to the furnace the values shown in Fig. 10 would have been larger.

Time Consumed in Attending Furnace

For the purpose of determining the time consumed in attending the furnace, measurements were made by means of a stop watch of the time consumed in shaking grates, removing ashes or clinkers, firing coal into the furnace or hopper, and leveling the fuel bed. The total time consumed per day is shown in the lower group of curves in Fig. 10. These values do not include the time necessary to walk from the first-story living room to the furnace and back. In the case of the Research Residence approximately 1¾ min per trip were required. Hence, if it is desired to account for this time, an addition of 4 x 1.75 or 7.0 min for the hand-fired plant and 1¾ min for the stoker-fired plant may be added to the values shown in Fig. 10.

The total time consumed in attending the furnace on an average day in which the indoor-outdoor temperature difference was 34 F was $15 + 7 = 22$ min for the hand-fired plant and $8 + 1\frac{3}{4} = 9\frac{3}{4}$ min for the stoker-fired plant, or a difference of 12¼ min per day. For a heat-

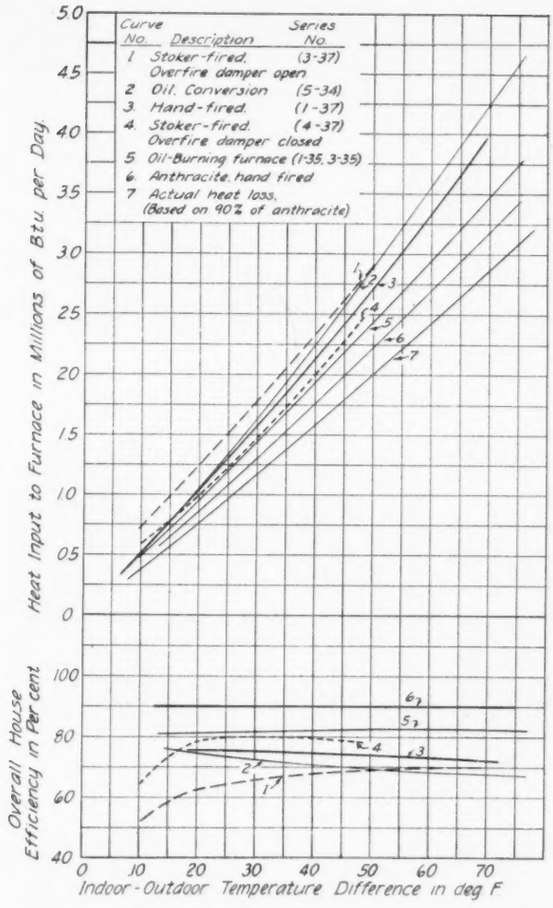

Curve No. Description Series No.
1 Stoker-fired, Overfire damper open (3-37)
2 Oil, Conversion (5-34)
3 Hand-fired (1-37)
4 Stoker-fired, Overfire damper closed (4-37)
5 Oil-Burning furnace (1-35, 3-35)
6 Anthracite, hand fired
7 Actual heat loss, (Based on 90% of anthracite)
Heat Input to Furnace in Millions of Btu per Day
Overall House Efficiency in Per cent
Indoor-Outdoor Temperature Difference in deg F

Fig. 11—Heat inputs to Research Residence. Season 1934-38

ing season consisting of 200 days, this difference would amount to

$$\frac{200 \times 12.25}{60}$$

or approximately 41 hours.

Over-All House Efficiency

The significance of over-all house efficiency was discussed in a previous publication,[6] and further data on this subject were obtained on the stoker tests. In order to compare the fuel consumption with oil, anthracite, and bituminous coal, the fuel quantities shown in Fig. 9 were reduced to terms of heat input to the furnace, in millions of Btu per 24 hours, and were plotted as shown by curves Nos. 1, 3, and 4 in Fig. 11. The values for oil, (curves Nos. 2 and 5) and anthracite (curve No. 6) have been reproduced from a previous paper.[7] In all cases the operation of the heating plant was controlled by means of sensitive thermostatic controls.

From analysis of the flue gases when anthracite was used as a fuel, the heat lost in the gases escaping from the chimney, which represented heat furnished by the fuel that was not ultimately available for heating the house, was determined as approximately 10 per cent of the total heat input to the furnace. The actual heat loss from the house (curve No. 7) was then derived from the experimental results for heat input obtained with anthracite as a fuel (curve No. 6). By using these derived values of the actual heat loss from the house in connection with the fuel consumption curves for the hand-fired and stoker-fired plants, the over-all house efficiency, or the ratio of the heat loss from the house to the heat input to the furnace, could be calculated as shown in the lower part of Fig. 11. For an indoor-outdoor temperature difference of 34 F the over-all house efficiencies were 80 per cent with the stoker-fired plant having over-fire damper closed, 75 per cent with the hand-fired plant, and 67 per cent with the stoker-fired plant having over-fire damper open. The value of 75 per cent obtained with the hand-fired plant using bituminous coal is in substantial agreement with results[8] previously obtained in the Research Residence.

The results obtained from these tests were to a great extent dependent upon the method of operation used. The conditions of hand firing which were maintained simulated normal intelligent firing of a thermostatically-controlled hand-fired plant. In the case of the hand-fired plant, it is probable that the fuel consumption would have been larger if lump coal, rather than sized coal adapted to hand firing, had been used; if hand control, rather than automatic thermostatic control, had been used; or if the coal had been thrown on top of the fire rather than to one side.

Smoke Density

The smoke density meter, consisting of a lamp and a thermopile, as shown in Fig. 6, used in connection with a recording potentiometer, provided a means for obtaining continuous records of the index of smoke density in the smoke pipe. The lamp voltage was adjusted, by means of a rheostat, so that when no smoke passed through the smoke pipe a maximum reading of five millivolts was obtained from the thermopile upon which the light beam was received. Smoke passing through the smoke pipe reduced the intensity of the light beam reaching the thermopile. When the light beam was completely intercepted the thermopile gave a reading of zero millivolts.

For the purpose of calibrating the instrument in terms of the more familiar Ringelmann numbers, the electromotive force generated by the thermopile was observed by means of the potentiometer, and at the same time the

[8]Loc. cit. Note 6.

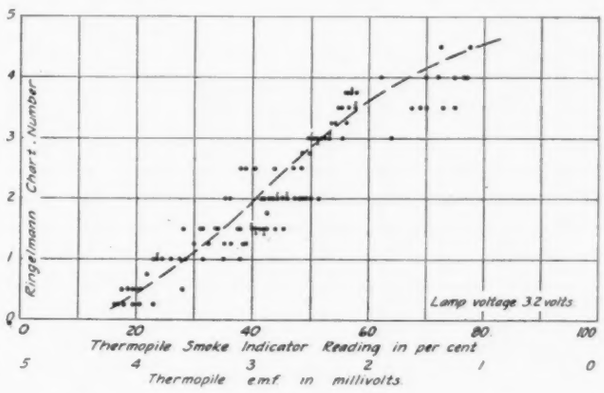

Ringelmann Chart Number
Lamp voltage 3.2 volts
Thermopile Smoke Indicator Reading in per cent
Thermopile emf in millivolts

Fig. 12—Calibration of smoke density recording instrument

[6]Investigation of Warm-Air Furnaces and Heating Systems, Part IV, by A. C. Willard, A. P. Kratz, and V. S. Day, (University of Illinois, *Engineering Experiment Station Bulletin* 189, Chapter V.)
[7]Loc. cit. Note 2.

smoke emitted from the top of the chimney was compared with Ringelmann charts. The calibration curve for the instrument, with the check draft sealed in order to prevent air leakage between the instrument and the top of the chimney, is shown in Fig. 12. It may be noted that an indicator reading of 2.4 millivolts was obtained with smoke density corresponding to No. 3 Ringelmann. It is common practice for smoke ordinances to limit the production of smoke to six minutes of No. 3 smoke in an hour.

The index of smoke density, plotted against the time in hours after the coal was fired, is shown for the hand-fired furnace in the upper part of Fig. 13. The scale of Ringelmann numbers is given on the right hand side of the graph. It was observed that, when coal was added to the fuel bed at a time when low combustion rates were maintained, the comparatively low temperatures of the fuel bed resulted in correspondingly small rates of evolution of the gases and of formation of smoke. This condition is shown by the curve designated as the *upper range* in Fig. 3, and it may be observed that in this case the recommended limit of No. 3 smoke for a period of six minutes was never exceeded. However, when coal was added to a comparatively hot fuel bed, it was rapidly volatilized and large quantities of smoke were evolved for a period of approximately 15 min after the coal was fired, as shown by the curve designated as the *lower range* in Fig. 13. Under these conditions the smoke given off by the fresh charge of coal exceeded the maximum limit of six minutes per hour of No. 3 Ringelmann density. In general, the amount and duration of the smoke produced by the hand-fired furnace were largely dependent upon the temperature of the fuel bed at and immediately following the time of firing. After the gases had been driven off from the fresh charge of coal, and the fuel had been coked, the density of smoke was ordinarily less than No. 2 Ringelmann.

In both cases with stoker firing, as shown in the lower diagrams in Fig. 13, the density of smoke during the on-periods of the stoker was less than No. 1 Ringelmann and could be considered as practically negligible. During the period of approximately 30 seconds after the stoker was stopped the smoke density increased sharply to attain a maximum value of about No. 3 Ringelmann. It then decreased rapidly during the succeeding two minutes. For a few seconds in each hour a smoke density of No. 3 Ringelmann was obtained. The smoke conditions accompanying the use of the stoker-fired furnace with the over-fire damper open could be considered as entirely satisfactory. However, with the over-fire damper closed, the combustion which occurred during the off-periods of the stoker was accompanied by some evolution of smoke and the formation of soot which coated the heating surface. It is probable that operation of the furnace for an entire season under these conditions would have resulted in some decrease in effectiveness of heat transmission and in some difficulties in maintaining proper draft. Hence, although the closing of the over-fire damper resulted in better fuel economy, this economy was obtained by a sacrifice of clean heating surfaces. Some amount of over-fire air was necessary in order to prevent the accumulation of soot. It is probable that the amount of over-fire air necessary would to a great extent be dependent upon the type of coal and the type of furnace and stoker used.

Incidental Data

With the cooperation of the Illinois State Geological Survey, motion pictures of the fuel bed in the stoker-fired plant were made. Typical photographs showing various stages in the combustion process were made from enlargements of the original film and are shown in Fig. 14. Figs. 14a and 14b show conditions common

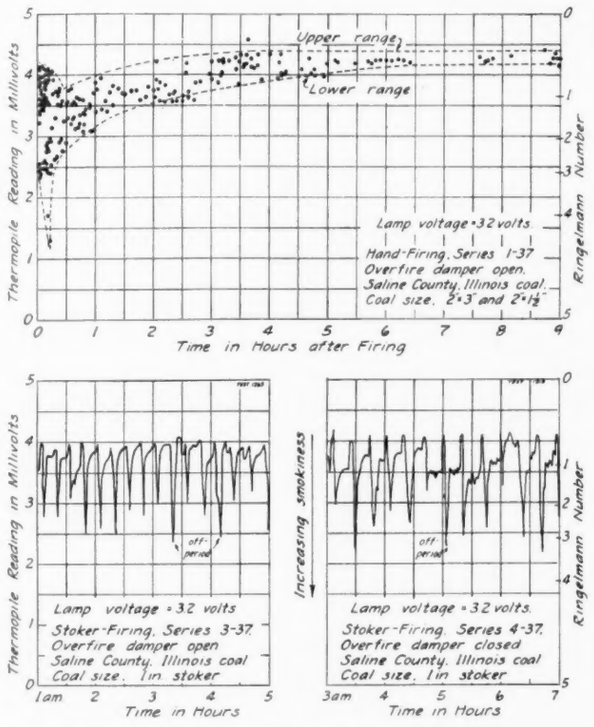
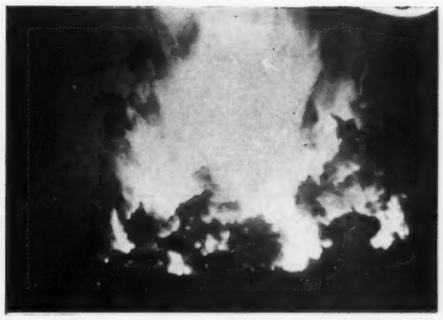


Fig. 13—Smoke density records for hand-fired and stoker-fired furnace. Research Residence data. Season 1937-38, Series 1-37, 3-37 and 4-37

to both series of tests. Figs. 14c and 14d refer to conditions with the over-fire damper open, and Figs. 14e and 14f to those with the over-fire damper closed. None of these photographs shows any evidence of coke-tree formations. Furthermore, no difficulty was experienced from failure to form clinkers. Fig. 14a represents the fuel bed immediately after the stoker started, and shows active combustion starting in the center. The clarity of details indicates the entire absence of smoke. Fig. 14b was taken after the combustion had progressed for five minutes, and shows active and smokeless combustion occurring over the major part of the fuel bed. Fig. 14c shows that, immediately after the stopping of the stoker and with the over-fire damper open, the combustion in the fuel bed continued rather actively with air furnished through the over-fire damper, and that a slight amount of smoke was formed. Fig. 14d taken five minutes after the stoker was stopped shows that, with the over-fire air damper open, combustion in the fuel bed continued even during the off-period of the stoker. It may also be noted that the production of smoke had ceased by this time.

Fig. 14e shows that, immediately after stopping the stoker with the over-fire damper closed, combustion again continued in the fuel bed. However, in this case the reduction in the amount of over-fire air resulted in the formation of a considerable amount of smoke, and the evolution of smoke continued for five minutes after

(*a*) Beginning of stoker operation

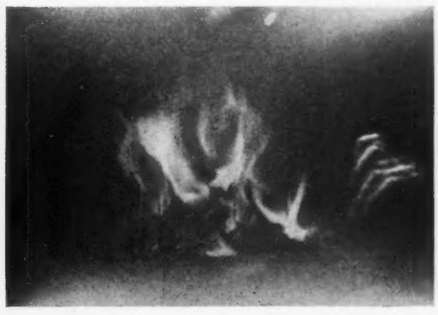


(*b*) After five minutes of stoker operation

(*c*) Beginning of off-period, over-fire damper open

(*e*) Beginning of off-period, over-fire damper closed

(*d*) Five minutes after stopping stoker, over-fire damper open



(*f*) Five minutes after stopping stoker, over-fire damper closed

Fig. 14—Photographs of stoker fuel bed

the stoker was stopped, as shown by Fig. 14f. Even in this case combustion continued during the off-period of the stoker, but not as actively as it did with the over-fire damper open.

An inspection of the radiator, the smoke pipe, and the chimney clean out indicated that in the case of the stoker-fired plant considerable amounts of fly ash were deposited. The ash per pound of coal fired (theoretical ash) was 7.39 per cent; whereas the actual weight of all the ash and clinkers, together with any unburned combustibles, removed from the fuel bed was 7.00 per cent by weight of the coal fired. A chemical analysis of the ash and clinkers removed from the furnace indicated that only a trace of unburned combustibles (less than 0.05 per cent) remained in the ash. Hence, the difference of 0.39 per cent of the weight of coal fired may be considered as an index of the amount of ash, in the form of fly ash, that was not removed through the feed door. This represents an amount equivalent to 0.39 lb of fly ash per 100 lb of coal fired, or 7.8 lb per ton of coal fired. In the case of the hand fired plant the difference between the weight of the ash and refuse and the theoretical weight of ash was approximately five per cent. Since no appreciable amount of fly ash was in evidence, this five per cent may be regarded as combustible lost in ash.

These preliminary studies with a stoker-fired furnace have indicated that the results obtained are dependent upon the adjustments made in the operating conditions. Further tests are contemplated, particularly with reference to the effect of varying the rate of coal input and the rate of burning on the over-all plant performance.

Summary and Conclusions

The following summary and conclusions may be considered as applying to the Research Residence and the conditions under which the tests were conducted.

(1) The method of control used, consisting of a room thermostat and a bonnet thermostat which operated both the circulating fan motor and the stoker motor, was found to be highly satisfactory for a forced-air heating plant fired by an underfeed stoker.

(2) With a given indoor-outdoor temperature difference, the weight of coal burned in the hand-fired plant was less than that burned in the stoker-fired plant in which the over-fire damper was wide open, but was greater than that burned in the stoker-fired plant in which the over-fire damper was closed.

(3) The burning that occurred during the off-periods of stoker operation constituted a relatively important part of the entire burning process.

(4) For a coal input rate of 48.6 lb per hour, the electrical energy consumption of the stoker motor was 7.8 kwhr per ton of coal fired.

(5) The total time consumed in attending the furnace on an average day was 22 min for the hand-fired plant and 9¾ min for the stoker-fired plant.

(6) During the period of approximately 30 seconds after the stoker was stopped, the smoke density increased sharply to attain a maximum value of about No. 3 Ringelmann and then decreased rapidly during the succeeding two minutes.

(7) With the over-fire damper closed the combustion which occurred during the off-periods of the stoker was accompanied by some evolution of smoke and formation of considerable soot.

(8) In stoker-fired furnaces it is advisable to provide accessible clean-out doors for the removal of any fly ash which may accumulate in the gas passages.

(*Continued on page 66*)

MORTON OIL COMPANY
169 MEDFORD ST. MALDEN.
FLUID AIR CONDITIONING

OUTSIDE TEMPERATURE: 0°
ATTIC TEMPERATURE: 10°
GROUND TEMPERATURE: 50°

Cubic Content 29614 × Air Chng 5 / 60 = CFM 2470
CFM 2470 ÷ 0 = .0182
BTU 135,315
Register Temp = 121° Bonnet Temp 134°

FACTORS: Wall .06 .62; Glass .13; Infiltration .018; Ceiling .10; Roof ·; Floor .34 .66

Floor	Room	Exp. Use Allow.	Dir	%	Room Dimensions L	W	H	Vol	Exposed Areas Wall Gross	Glass	Net	Ceiling	Floor	Wall Below Grade	Room Temperature	Infiltration Foot Cracks	CFM	BTU	Wall BTU	Glass BTU	Ceiling BTU	Floor BTU	Wall Below Grade BTU	Net BTU Loss	Total Loss Exposure Allowing	Air CFM Req.	Stack No.	Supply Riser Sizes Actual Length	Temp Drop	Reg. Temp
																												= 37	= 18.5	
1	LIVING	SW	0		14	28	8	3140	384	105	279				70	53	1270	1600	1170	8100				10870	10870	202	2	38	19.0	115.5 .0183
1	DINING	E	2		15	13	8	1560	104	48	56				"	50	1200	1510	235	3850				5595	5700	106	3	29	14.5	120.5 .0183
1	NOOK	E	2		6	10	8	480	88	18	70				"	17	407	513	294	1390				2197	2235	42	4	27	13.5	121.5 .0180
1	RECEPT'N AL.	W	5		16	14	8	1790	88	39	49				"	37	889	1125	205	3090				4420	4650	87	5	29	14.5	120.5 .0182
1	LIBRARY	W	5		9	12	8	865	72	17	55				"	17	407	513	232	1390				2135	2230	42	6	18	9.0	125.5 .0170
1	WAITING	W	5		11	12	8	1055	88	35	53				"	35	840	1065	222	2700				3987	4190	78	7	16	8.0	126.5 .0168
1	KITCHEN	E	2		12	14	8	1345	96	42	54				"	28	672	845	226	3240				4311	4400	82	8	13	6.5	127.5 .0164
1	LAVATORY	E	2		3½	9	8	252	28	10	18		32		"	12	288	363	75	770		762		1970	2010	38	9	34	17.0	112.5 .0192
1	OFFICE #1	W	5		7	9	8	505	74	13	11		63		"	12	288	363	46	1030		1500		2939	3085	57	10	15	7.5	126.5 .0164
1	VESTIBULE	W	5		4	4	8	128	64	41	23		16		"	19	456	574	97	3240		380		4291	4500	84	11	17	8.5	127.5 .0163
1	OFFICE #2	W	5		10	10	8	800	164	35	125		100		"	18	432	544	525	2770		2280		6119	6440	120	12	30	15.0	119.0 .0184
1	OFFICE #3	NW	7		12	10	8	960	176	32	144		120		"	17	407	514	606	2530		2850		6500	6950	129	13	32	16.0	118.0 .0190
2	MAST. CHA.	SW	0		20	14	8	2240	208	56	152	270			"	31	744	940	640	4300	1670			7550	7550	141	14	49	24.5	109.5 .022
2	DRESS RM.	SE	0		7	8	8	450	112	14	98	56			"	15	360	354	412	1110	336			2212	2212	42	15	48	24.0	110. .022
2	MAST. BATH	E	2		7	7	8	392	56	14	42	49			"	15	360	354	176	1110	294			1934	1970	37	16	48	24.0	110. .022
2	CHILD'S RM.	E	2		14	15	8	1680	112	28	84	210			"	30	720	908	353	2220	1260			4741	4840	91	17	39	19.5	114.5 .0201
2	BATH #2	E	2		6	7	8	336	56	13	43	42			"	15	360	454	181	1030	252			1917	1955	37	18	40	20.0	114.5 .0203
2	HALL	N	5		12	18	8	1620	96	24	72	216			"	15	360	454	302	1850	1300			3806	4010	75	19	36	18.0	116.0 .0196
2	CHAM #3	E	2		12	10	8	960	96	28	68	120			"	30	720	908	284	2160	720			4072	4150	77	20	26	13.0	121.5 .0181
2	CHAM #4	W	5		17	12	8	1620	216	38	178	204			"	43	1070	1300	750	2920	1240			6210	6540	122	21	21	10.5	123.5 .0174
2	MAID'S	NW	7		10	10	8	960	336	26	310	120			"	15	360	354	1420	2000	720			4514	4840	91	22	41	20.5	113.5 .0205
2	MAID'S BA.	E	2		4	7	8	224	32	14	18	28			"	15	360	354	76	1110	168			2708	2760	52	23	42	21.0	113.5 .0207
B	RE. CRN RM				13	26	8	2700	336	24	310		338		"	18	432	544		1900		4450	9350	16244	16244	310	24	36	18.0	116.0 .0196
B	HALL				12	18	8	1730	104	0	104		218		"	-	-	-		-		2880	2840	5720	5720	107	25	24	12.0	122.0 .0178
B	LAUNDRY				14	14	8	1570	96	6	90		196		"	9	206	259		475		2580	5950	9264	9264	173	26	30	15.0	119.2 .0186
B	TOILET				6	5	8	240	88	0	88		30		"	9	206	259		-		296	5450	6005	6005	113	27	21	10.5	123.5 .0174
								29,614																135,315						
																							15%	20,350						
																								155,665						

Residence Heated for $1.00 per 1,000 Btu's With a Technical Code Installation

By Clifford H. Dow

Engineer, Morton Oil Co., Malden, Mass.

THE following is a brief outline of the results obtained with a winter air conditioning system in a seventeen room house for the heating season of 1937-1938.

The house, located in Malden, Mass., a suburb of Boston, is of Georgian Colonial architecture. It serves a dual purpose in the fact that it provides office space and examination rooms in addition to the living quarters for the owner who is a physician. It is of frame construction with overall dimensions of 67 feet by 39 feet and 8 foot ceilings on the first and second floors. The windows are of the double hung type and are weatherstripped while the outside walls and second floor ceiling are thoroughly insulated with 3½ inches of rock wool. The main section of the house consists of six rooms and a reception hall on the first floor and four bedrooms, two bathrooms and a dressing room on the second floor. The office section consists of a waiting room, two offices, an examination room, a lavatory and a maid's room and bath. In the heated section of the basement there is a recreation room, a hall, a laundry, and a lavatory.

The heat loss and duct layout were made in accordance with the new Technical code of the National Warm Air Heating and Air Conditioning Association, the calculations of which are shown on the accompanying data sheet. The sheet is a combination of the two sheets recommended by the association. The heat loss at the bonnet of the conditioner after allowing 15 per cent for duct transmission losses was 155,665 Btu's per hour. The amount of air required for five air changes per hour was 2,470 cubic feet per minute. The unit selected was a Fluid Heat winter air conditioner of the direct fired type with a capacity of 226,500 Btu's per hour at the bonnet and a cfm delivery of 2,525 at a static pressure of .375 inches of water gauge. The burner was a Model P-3 Fluid Heat pressure type

LONGEST ACTUAL LENGTH = 49' / 2 x ½° + REGISTER TEMP. 121° = BONNET TEMP. = 134°
DESIGN STATIC PRESSURE = .06 — CONDITIONER NO. = *3-235,000 Btu — FAN SIZE 2525 Cfm

OWNER
ADDRESS
ARCHITECT
BUILDER

PLAN NO 36
SHEET NO 2
DATE 3/21/39
DRN BY CRE CHD BY QHH

SUPPLY RISER SIZES

Actual CFM Req	Elbow Allow Len	Equiv Length	Round Pipe Size	Core Factor	Round Pipe Core	Riser Size	Reg. Vel	Reg Size
106	45	82	6.9	.969	6.7	12x3½		12x4
109	35	73	7.0	.939	6.6	12x3½		12x4
104	45	74	6.9	.941	6.5	12x3½		12x4
41	45	82	5.0	.969	4.9	8x3		8x4
85	35	64	6.4	.913	5.9	10x3		10x4
38	25	43	5.0	.845	4.2	8x3		8x4
71	25	41	6.0	.839	5.0	8x3		8x4
72	25	38	6.0	.825	5.0	8x3		8x4
39	45	79	5.0	.962	4.8	8x3		8x4
51	25	40	5.3	.835	4.5	8x3		8x4
74	25	42	6.1	.841	5.2	8x3		8x4
120	35	65	7.3	.917	6.7	12x3½		12x4
132	35	67	7.5	.920	6.9	12x3½		12x4
166	65	114	8.2	1.026	8.4	14x4½		14x6
48	65	113	5.2	1.026	5.4	8x3½		8x6
44	45	93	5.0	.990	5.0	8x3		8x6
98	45	84	6.8	.973	6.6	12x3½		12x6
40	45	85	5.0	.974	4.9	8x3		8x6
79	35	71	6.3	.934	5.9	10x3		10x6
75	25	51	6.1	.874	5.3	8x3½		8x6
114	35	56	7.2	.888	6.4	10x3½		10x6
100	55	96	6.8	.992	6.8	12x3½		12x6
57	45	87	5.5	.975	5.4	8x3½		8x6
320	20	66	10.5	.925	9.7			16x6
104	30	44	6.9	.947	6.5			12x6
173	20	60	8.4	.905	7.6			14x6
105	20	41	6.9	.838	5.8			8x6
2465								

RETURN RISER SIZES

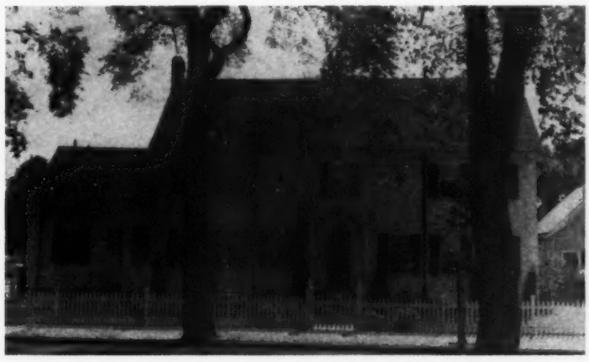
Stack No	Actual Length	Elbow Allow Len	Equiv Length	Actual CFM	Round Pipe Size	Core Factor	Round Pipe Size	Riser Size	Grille Vel	Grille Size
28	47	45	92	177	8.4	.980	8.2	14x4½		14x8
29	51	55	106	136	7.6	1.010	7.7	14x5		14x6
30	55	55	110	84	6.4	1.020	6.5	12x3½		12x6
31	44	65	109	167	8.2	1.020	8.3	14x4½		14x8
32	51	65	116	130	7.5	1.030	7.7	14x3½		14x6
33	22	55	77	151	7.9	.950	7.5	14x3½		14x6
34	28	35	63	698	14.0	.910	12.7			16x10
35	28	55	83	102	6.8	.970	6.6	12x3½		12x6
36	14	35	49	120	7.3	.870	6.4	12x3		12x6
37	23	55	78	118	7.3	.960	7.0	12x3½		12x6
38	31	65	96	120	7.3	.990	7.2	14x3½		14x6
39	33	65	98	122	7.3	.950	6.9	12x3½		14x6
40	24	65	89	148	7.9	.980	7.7	14x4		14x6
41	25	45	70	102	6.8	.930	6.3	12x3		12x6
42	40	75	115	95	6.7	1.020	6.9	12x3½		12x6

SUPPLY TRUNK SIZES

Stack No	CFM Branch	CFM Trunk	Round Pipe Before Core	Core Factor	Round Pipe Core	Rectangular Equivalent
15		48	5.2	1.024	5.4	3½ x 8
1		106	6.9	.969	6.7	4½ x 8
		154	8.0	1.024	8.2	7 x 8
14	166		8.2	1.026	8.4	7½ x 8
16	44		5.0	.990	5.0	3 x 8
	210		8.9	1.026	9.2	9 x 8
24	320		10.5	.925	9.7	10 x 8
	530	530	12.7	1.026	13.0	18 x 8
		684	13.9	1.026	14.3	22 x 8
26	173		8.4	.905	7.6	6 x 8
18	41		5.0	.974	4.9	3 x 8
	214		9.0	.976	8.8	8 x 8
17	98		6.8	.973	6.6	4½ x 8
	312		10.4	.974	10.1	11 x 8
3	104		6.9	.941	6.5	4½ x 8
	416		11.6	.974	11.3	13½ x 8
4	41		5.0	.969	4.9	3 x 8
	457	457	12.0	.974	11.7	14½ x 8
		1141	16.25	1.026	16.7	31½ x 8
27		105	6.9	.838	5.8	3½ x 8
		1246	17.4	1.026	17.9	32 x 10
20		75	6.1	.874	5.3	3 x 8
		1321	17.75	1.026	18.2	33 x 10
8		72	6.0	.825	5.0	3 x 8
		1393	18.1	1.026	18.6	35 x 10
19		79	6.3	.934	5.9	3½ x 8
2		109	7.0	.939	6.6	4½ x 8
		188	8.6	.939	8.1	7 x 8
25		104	6.9	.947	6.5	4½ x 8
		292	10.1	.947	9.6	10 x 8
5		85	6.4	.913	5.9	3½ x 8
		377	11.2	.947	10.6	12 x 8
22		100	6.8	.992	6.8	4½ x 8
13		132	7.5	.920	6.9	5 x 8
		232	9.3	.992	9.2	8½ x 8
12		120	7.3	.917	6.7	4½ x 8
		352	10.9	.992	10.8	12½ x 8
9	39		5.0	.962	4.8	3 x 8
23	57		5.5	.975	5.4	3½ x 8
	96	96	6.6	.975	6.5	4½ x 8
		448	11.9	.992	11.8	15 x 8
21		114	7.2	.882	6.4	4½ x 8
		562	12.9	.992	12.8	17½ x 8
6	38		5.0	.845	4.2	3 x 8
7	71		6.0	.839	5.0	3 x 8
	109		7.0	.845	5.9	4 x 8
11	74		6.1	.841	5.2	3 x 8
	183		8.5	.845	7.2	5½ x 8
10	51		5.3	.835	4.5	3 x 8
	234	234	9.3	.845	7.9	6½ x 8
		796	14.7	.992	14.5	23 x 6

RETURN TRUNK SIZES

Stack No	CFM Branch	CFM Trunk	Round Pipe Before Core	Core Factor	Round Pipe Core	Rectangular Equivalent
28		177	8.4	.980	8.2	7x8
29		136	7.6	1.010	7.7	6x8
		313	10.5	1.010	10.6	12x8
30		84	6.4	1.020	6.5	4½x8
		397	11.4	1.020	11.6	14x8
31		167	8.2	1.020	8.3	7x8
32		130	7.5	1.030	7.7	6x8
		297	10.2	1.030	10.5	11½x8
33		151	7.9	.950	7.5	6x8
		448	11.9	1.030	12.3	16x8
35		102	6.8	.970	6.6	4½x8
		550	12.8	1.030	13.2	16½x8
36		120	7.3	.870	6.4	4½x6
		670	13.8	1.030	14.2	22x8
37		118	7.3	.960	7.0	5x8
		788	13.8	1.030	15.0	25x8
34	698		14.0	.910	12.7	17½x8
38	120		7.3	.990	7.2	5½x8
	818	818	14.85	.990	14.7	26x8
		1606	19.0	1.030	19.6	34x10
39		122	7.3	.950	6.9	5x8
40		148	7.9	.980	7.7	6x8
		270	9.6	.980	9.6	9½x8
41	102		6.8	.930	6.3	4½x8
42	95		6.7	1.020	6.9	5x8
	197	197	8.3	1.020	8.5	7½x8
		467	12.1	1.020	12.3	16x8



burner with a nozzle capacity of 1.65 gallons per hour.

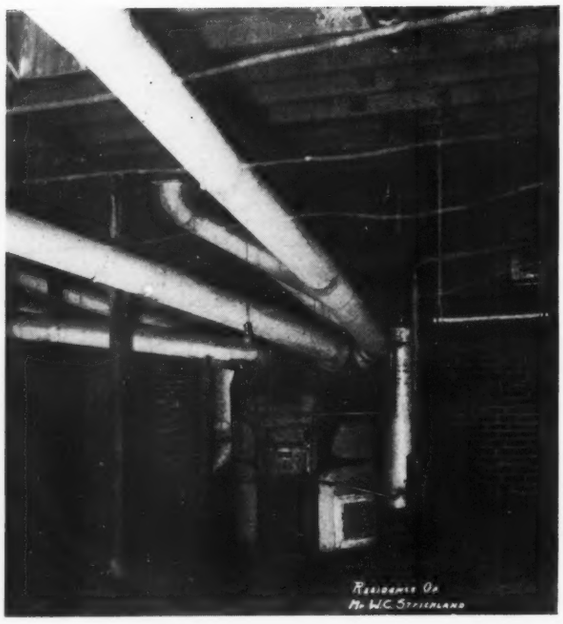
The duct system is of graduated trunk line design with splitter dampers at the point where the branch ducts join the main trunk line. The temperature drop per foot of duct was calculated at ½ a degree per foot of horizontal run. The system was designed on a resistance of .06 inches of water gauge. The register temperatures varied from 110 degrees at the most remote register to 127 degrees at the nearest register with a bonnet temperature of 134 degrees. These temperatures are comparatively low but are necessary to allow for five air changes per hour.

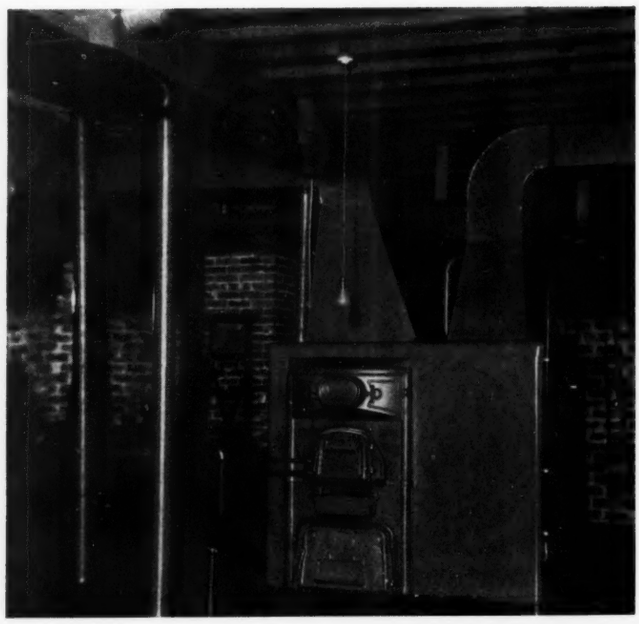
The registers on the first floor are located on the inside walls six feet six inches above the floor level and have a five-way deflection. The second floor registers are located in the walls just above the base-board and have a straight outward flow. All return air grilles are installed in the base-board with the bottom flange flush with the floor. The returns from the bedrooms are registers rather than grilles so that they may be closed during the night when the windows are open. An outside air duct admits about ten per cent fresh air into the system during the winter and one hundred per cent during the summer. The baths and lavatories are vented to the attic space by a duct with a goose neck to prevent down draft when the fan is not in operation. The kitchen is vented by a 10-inch fan exhausting to the outside.

When the system was installed, an estimated fuel consumption of 3,270 gallons of oil was made assuming a normal Boston winter of 6,055 degree days and an efficiency of 70 per cent for the system. From the first of September, 1937, to the first of May, 1938, there were 5,580 degree days and the fuel consumption was 2,269 gallons. The retail price of oil in Boston for the past season was seven cents per gallon which makes a total heating bill of $158.00 for the season, or about one dollar per thousand Btu's of heat loss.

The system required very little adjusting after the installation and the results obtained have proved most satisfactory to the owner.

The Morton Oil Company of Malden, Massachusetts, handled the complete installation including the fabrication and installation of the sheet metal work.





Satisfied Users Sell Stokers

for the Geo. F. Wheelock Co., Birmingham, Ala.

By Geo. H. Watson

IT TOOK three months for the George F. Wheelock Company, Birmingham, Ala., to sell its first stoker. That was five years ago. During 1938 the company sold upwards of 250 coal stokers and for the 1939 season expects the figure to go to even higher.

Selling the first stoker in 1932 was difficult because times were hard and home owners didn't know much about this appliance. Since that time the concern has utilized every possible means to establish itself as stoker headquarters in Birmingham. In addition the company has appointed live dealers all over Alabama who are doing some effective selling in their own areas.

The first man who bought a stoker from the Wheelock Company was an engineer. He liked the comfort and convenienve of automatic heat so well that he helped the company make sales to two of his friends. It has been that way every since. The company has been making salesmen out of its satisfied users; a case of "using the user." Active outside solicitation, all types of advertising and an effective service department, have helped to build up a popular acceptance of stokers almost unbelieveable five years ago.

George F. Wheelock, president, reports that the stoker is now where the electric refrigerator was four or five years ago—that is, "everybody wants one." He reports that nearly all new houses of the better type have some form of automatic heat. It is the pioneering

◆

Above—Typical stoker installation showing old gravity, hand-fired system (left) and new special, stoker-fired furnace (Williamson) with new piping system (Right). At right—Wheelock showroom with Geo. F. Wheelock (right) pointing out features of modern equipment. On facing page, a typical Wheelock newspaper advertisement.

of Mr. Wheelock and other dealers like him that has created this acceptance.

"Our sales folder prepared for this year's program consists entirely of a list of satisfied users, both domestic and commercial, together with testimonials from one or two of them," says Mr. Wheelock. "Copies of this folder are given to prospects and we find it the best kind of sales ammunition. The prospect can look over this list, see the names of various stoker owners he knows and if he likes consult with them on their experience with the appliance.

"We find that stoker owners almost uniformly take pride in their possessions, are willing to talk about them by the hour, and take visitors to the basement to see them. So it is an easy thing to get your customers to work for you.

24-Hour Service Featured

"An efficient service department is quite a factor in a satisfied stoker clientele. Our service is supervised by a stoker expert and is available on call day or night (three telephone numbers being listed in the directory). We endeavor to give the kind of service that can not be described in a contract. The fact that we do have our own service department, that we have been in business since 1888 and expect to continue in business, are used as sales levers. We also service stokers sold by our dealers in the Birmingham territory, a flat charge of $5 for service during the guarantee period being made.

"We do not sell stokers for household use on the claim that they will reduce fuel bills, although this may happen in some cases. We recommend the use of the best grade of stoker coal, one low in ash content. Recommending the use of a mine run coal will give stokers a black eye.

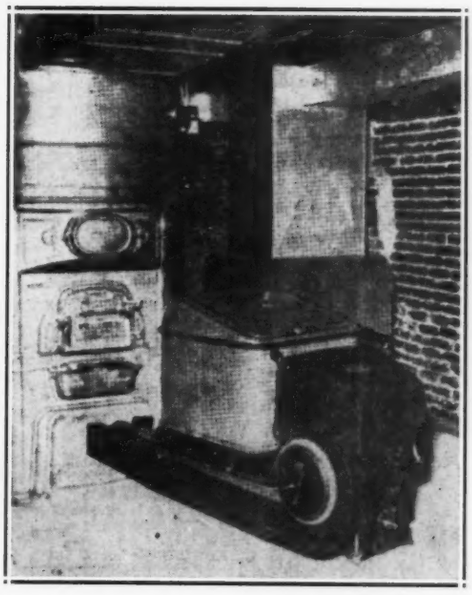
"Our argument for the sale of the coal stoker is the even temperature that it provides and the emancipation from the drudgery of hand firing. For the husband we argue that he should relieve his wife of the all-day-long job of firing the furnace, especially since he has provided her with all kinds of other electrical convenience including a refrigerator, a vacuum cleaner and perhaps an electric mixer."

Display Floor Advantageous

Installed in the middle of Mr. Wheelock's office is a coal stoker which, with a warm air furnace of the latest type, provides heat for the whole building. The floor is as spic and span as the living room of most any home, a pretty good substantiation of the claim that coal heat can be clean. He also has pictures to show customers how home owners have been able to convert their basements into real show places after installing stokers and getting rid of the dust, dirt and ashes incident to hand firing.

Mr. Wheelock has utilized practically every kind of advertising. This includes participation in the cooperative campaigns sponsored each year by the Birmingham Electric Company with the coal companies bearing part of the expense. He has entered booths at all the home shows and furnished the stoker and furnace for the

Cease Firing by hand!



INSTALLED ON PAYMENTS as low as $7.34 PER MONTH

STOKOL AUTOMATIC COAL STOKER

STOKOL coal stokers bring automatic heat within everybody's reach. A small down payment installs a STOKOL in your present coal-burning heating plant—monthly payments as low as $7.34—little, if any, more than you pay someone to "fire" your furnace or steam plant each morning.

And STOKOL is on the job 24 hours a day. Adding new fuel when necessary. Automatically regulating the drafts. All YOU do is set the thermostat control in the living room—and STOKOL maintains a steady, even, healthful temperature. No running up and down basement stairs. No fires to build. No fuel to shovel. No ashes to remove.

EXCLUSIVE STOKOL FEATURES

Fully Automatic—Thermostatically Controlled
Hydraulic Oil Transmission
No Shear Pins
Airtight Hopper
Safe, Clean, Dependable

What does this winter-long vacation for you and the wife cost? Nothing! for STOKOL burns inexpensive, dustless coal. Call us now for an estimate without obligation, or mail coupon for illustrated folder!

THE Geo. F. Wheelock Co.
STATE DISTRIBUTORS FOR STOKOL STOKERS
• SALES 3013 S. 2ND AVENUE • SERVICE

BETTER HOUSING BUREAU, Lyric Bldg., Birmingham, Ala.
Please mail me FHA pamphlets dealing with subjects checked:

( ) New Homes
( ) Paint-Wallpaper
( ) Roofing
( ) Hot Air Furnaces
( ) Home Bldg. Loans
( ) Electric Appliances
( ) Coal Stokers
( ) Lumber-Building Materials
( ) Plumbing Fixtures
( ) Norge Refrigerators, Ranges, Washers, Etc.
( ) Interior Decorating

NAME
ADDRESS

GENERAL CONTRACTORS
I. M. CRUM CONSTRUCTION CO. 840 St. Charles Ave. Phone 6-182
TOM G. ESTES & CO. Call Us Early In Your Planning
MARBURY-BORISS CONSTR. CO. Massey Bldg. Phone 3-727
RALPH A. SMALLMAN & CO. 1109 5th Ave., S. Phone 3-824

FHA REPAIR AND MODERNIZATION LOANS
BIRMINGHAM TRUST & SAV. CO Member Federal Deposit Ins. Corp.

At right — Stoker in Wheelock truck ready for delivery to owner. All necessary refractory, cement, hearth materials are always delivered with stoker. Below—Show window of Wheelock store painted and decorated for stoker sales.

Junior Chamber of Commerce model home which drew 25,000 visitors.

From this it may be seen that he has spent money and time in building up the stoker business because, he feels, he is in the heating and sheet metal business, has been for years, and the stoker business has now become an accepted part of modern heating.

At first the Wheelock company had difficulty obtaining good salesmen, but has not since the stoker has won wide public acceptance. Salesmen are paid on a commission basis and allowed a drawing account. The company, through its advertising, through that of the manufacturer, and through its satisfied users is pretty well able to keep its salesmen supplied with prospects without their having to resort to cold canvassing. The coal companies are also a fertile source of prospects, in fact a stoker and a coal dealer can be quite helpful to each other, one recommending the other's product.

Buyers are permitted to pay for the stokers on terms up to 24 to 36 months if they desire, but sales are made on a cash basis. The electrical cost of operating a stoker is so small as to be no barrier to sales, running less than $1.00 per month for the average size home.

Installations for the Wheelock company are made by a graduate engineer who understands fully the various factors involved such as design, type of heater employed, variation in load demand and its relation to capacity. Proper flame clearance, for example, is regarded as highly essential, even if a pit installation has to be made. Most of the troubles, the company finds, can be traced to improper installations. The company, with few exceptions, services only its own make of stokers.

Stoker Firing in the Research Residence

(*Continued from page* 61)

Acknowledgments

The results presented in this paper were obtained in connection with the investigation of warm-air furnaces and heating systems in the Research Residence,‡ at the University of Illinois, conducted by the Engineering Experiment Station of which M. L. Enger, Dean of the College of Engineering, is the director, and in the Department of Mechanical Engineering of which O. A. Leutwiler, Professor of Mechanical Engineering Design, is the head. This investigation is a cooperative project sponsored jointly by the *National Warm Air Heating and Air Conditioning Association* and the Engineering Experiment Station. These results will ultimately comprise part of a bulletin of the Engineering Experiment Station. Acknowledgments are also due to Dr. Louis C. McCabe, and Dr. Harold B. Willman, Associate Geologists of the Illinois State Geological Survey, for their assistance in making motion pictures of the fuel bed. The assistance of the various manufacturers who cooperated by furnishing instruments and equipment is gratefully acknowledged.

‡The Research Residence in Urbana, Ill. was built, furnished and completely equipped specifically for research work in warm-air heating by the *National Warm Air Heating and Air Conditioning Association* in December, 1924.

Weights of Galvanized Iron and Labor Time Required for

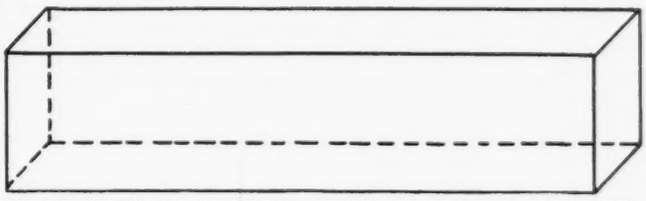
Fabricating Common Duct Sections

In the January and February issues we published parts 1 and 2 of this series covering weight of galvanized iron and labor time required to fabricate commonly used duct sections and fittings.

These reference figures were established by E. B. Root, The Nelson Co., Detroit, during a time when he was furnishing complete duct systems from blue prints to contractors. Each table has been built up from actual records established from shop records of actual operations. Each table assumes a good mechanic using adequate tools and requiring no time for laying out patterns. Duct seams are Pittsburgh locks and sections are made up of two or more pieces according to the size of the section. In all cases accepted practice is followed in determining the number of pieces.

The sizes tabulated cover all practical sections for residential mechanical heating systems or small ventilating or air conditioning systems.

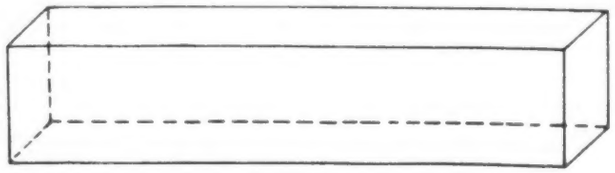
The purpose of the tables is to furnish a quick method for estimating the amount of material and labor cost involved in fabricating a duct system ready for erection.



WEIGHT AND TIME FOR RECTANGULAR DUCTS PER JOINT

9″

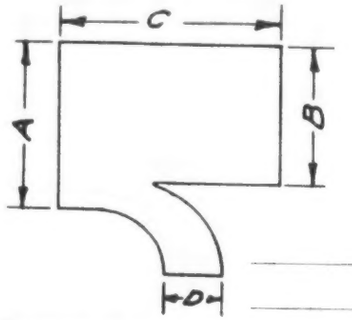
	1′		2′		3′		4′		5′		6′		7′		8′	
	WEIGHT	TIME	WEIGHT	TIME	WEIGHT	TIME	WEIGHT	TIME	WEIGHT	TIME	WEIGHT	TIME	WEIGHT	TIME	WEIGHT	TIME
44	10.8	30′	21.8	30′	32.5	30′	43.3	60′	.....	.....	.....	.....	.....	.....	.....	.....
42	10.4	30′	20.9	30′	31.3	30′	41.7	60′	.....	.....	.....	.....	.....	.....	.....	.....
40	10.0	30′	20.1	30′	30.1	30′	40.1	60′	.....	.....	.....	.....	.....	.....	.....	.....
38	9.6	30′	19.3	30′	28.9	30′	38.5	60′	.....	.....	.....	.....	.....	.....	.....	.....
36	9.2	30′	18.5	30′	27.7	30′	36.9	60′	.....	.....	.....	.....	.....	.....	.....	.....
34	8.8	30′	17.7	30′	26.5	30′	35.3	60′	.....	.....	.....	.....	.....	.....	.....	.....
32	6.6	30′	13.3	30′	19.9	30′	26.6	30′	33.2	30′	39.8	30′	46.5	30′	53.1	30′
30	6.3	30′	12.7	30′	19.0	30′	25.4	30′	31.7	30′	38.0	30′	44.4	30′	50.7	30′
28	6.0	30′	12.1	30′	18.1	30′	24.2	30′	30.2	30′	36.2	30′	42.3	30′	48.3	30′
26	5.7	30′	11.5	30′	17.2	30′	23.0	30′	28.7	30′	34.4	30′	40.2	30′	45.9	30′
24	5.4	30′	10.9	30′	16.3	30′	21.8	30′	27.2	30′	32.6	30′	38.1	30′	43.5	30′
22	5.1	30′	10.3	30′	15.4	30′	20.5	30′	25.7	30′	30.8	30′	35.9	30′	41.0	30′
20	4.8	30′	9.7	30′	14.5	30′	19.3	30′	24.2	30′	29.0	30′	33.8	30′	38.6	30′
18	4.5	30′	9.1	30′	13.6	30′	18.1	30′	22.7	30′	27.2	30′	31.7	30′	36.2	30′
16	4.2	30′	8.5	30′	12.7	30′	16.9	30′	21.2	30′	25.4	30′	30.0	30′	33.8	30′
14	3.9	30′	7.9	30′	11.8	30′	15.7	30′	19.7	30′	23.6	30′	27.5	30′	31.4	30′
12	3.6	30′	7.3	30′	10.9	30′	14.5	30′	18.2	30′	21.8	30′	25.4	30′	29.0	30′
10	3.3	30′	6.6	30′	10.0	30′	13.3	30′	16.6	30′	19.9	30′	23.2	30′	26.6	30′
9	3.2	20′	6.3	20′	9.5	20′	12.7	30′	15.9	30′	19.0	30′	22.2	30′	25.4	30′
8	3.0	20′	6.0	20′	9.1	20′	12.1	30′	15.1	30′	18.1	30′	21.1	30′	24.2	30′
7	2.9	20′	5.7	20′	8.6	20′	11.5	30′	14.4	30′	17.2	30′	20.1	30′	23.0	30′
6	2.7	20′	5.4	20′	8.2	20′	10.9	25′	13.6	30′	16.3	30′	19.0	30′	21.8	30′
5	2.6	20′	5.1	20′	7.7	20′	10.3	25′	12.9	30′	15.4	30′	18.0	30′	20.6	30′
4	2.4	20′	4.8	20′	6.3	20′	9.7	25′	12.1	25′	14.5	30′	16.9	30′	19.4	30′



Weight and Time for Rectangular Ducts per Joint

10″

	1′		2′		3′		4′		5′		6′		7′		8′	
	Wt.	Time	Wt.	Time	Wt.	Time	Wt.	Time	Wt.	Time	Wt.	Time	Wt.	Time	Wt.	Time
44	11.0	30′	22.0	30′	33.0	30′	43.9	60′	.....	.....	.....	.....	.....	.....	.....	.....
42	10.6	30′	21.2	30′	31.8	30′	42.4	60′	.....	.....	.....	.....	.....	.....	.....	.....
40	10.2	30′	20.4	30′	30.6	30′	40.8	60′	.....	.....	.....	.....	.....	.....	.....	.....
38	9.8	30′	19.7	30′	29.5	30′	39.3	60′	.....	.....	.....	.....	.....	.....	.....	.....
36	9.4	30′	18.9	30′	28.3	30′	37.8	60′	.....	.....	.....	.....	.....	.....	.....	.....
34	9.1	30′	18.1	30′	27.2	30′	36.2	60′	.....	.....	.....	.....	.....	.....	.....	.....
32	6.8	30′	13.6	30′	20.4	30′	27.2	30′	34.0	30′	40.8	30′	47.6	30′	54.4	30′
30	6.5	30′	13.0	30′	19.5	30′	26.0	30′	32.5	30′	39.0	30′	45.5	30′	51.9	30′
28	6.2	30′	12.4	30′	18.5	30′	24.8	30′	31.0	30′	37.1	30′	43.3	30′	49.5	30′
26	5.9	30′	11.8	30′	17.7	30′	23.6	30′	29.4	30′	35.3	30′	41.2	30′	47.1	30′
24	5.6	30′	11.2	30′	16.8	30′	22.3	30′	27.9	30′	33.5	30′	39.1	30′	44.7	30′
22	5.3	30′	10.6	30′	15.9	30′	21.1	30′	26.4	30′	31.7	30′	37.0	30′	42.3	30′
20	5.0	30′	10.0	30′	15.0	30′	20.0	30′	24.9	30′	29.9	30′	34.9	30′	39.9	30′
18	4.7	30′	9.4	30′	14.0	30′	18.7	30′	23.4	30′	28.1	30′	32.8	30′	37.4	30′
16	4.4	30′	8.8	30′	13.1	30′	17.5	30′	21.9	30′	26.3	30′	30.7	30′	35.0	30′
14	4.1	30′	8.2	30′	12.2	30′	16.3	30′	20.4	30′	24.5	30′	28.5	30′	32.6	30′
12	3.8	30′	7.6	30′	11.3	30′	15.1	30′	18.9	30′	22.7	30′	26.4	30′	30.2	30′
10	3.5	30′	6.9	30′	10.4	30′	13.9	30′	17.4	30′	20.8	30′	24.3	30′	27.8	30′
9	3.3	20′	6.6	20′	10.0	20′	13.3	30′	16.6	30′	19.9	30′	23.2	30′	26.6	30′
8	3.2	20′	6.3	20′	9.5	20′	12.7	30′	15.9	30′	19.0	30′	22.2	30′	25.4	30′
7	3.0	20′	6.0	20′	9.1	20′	12.1	30′	15.1	30′	18.1	30′	21.1	30′	24.2	30′
6	2.9	20′	5.7	20′	8.6	20′	11.5	25′	14.3	30′	17.2	30′	20.1	30′	23.0	30′
5	2.7	20′	5.4	20′	8.2	20′	10.9	25′	13.6	30′	16.3	30′	19.0	30′	21.7	30′
4	2.6	20′	5.1	20′	7.7	20′	10.3	25′	12.8	25′	15.4	30′	18.0	30′	20.5	30′



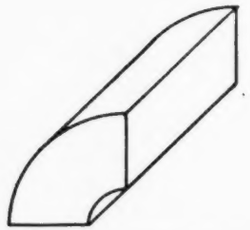
Reducing Joint with One Branch

Depth of Duct 10″

C	27″		24″		21″		18″		17″	
	D A-B		D A-B		D A-B		D A-B		D A-B D A-B	
	12x10 (8″)		12x10 (7″)		10x10 (6″)		9x10 (5″)		8x10-4″ 5x10-2″ 7x10-4″ 4x10-2″ 6x10-3″	
A	Weight	Time	Weight	Time	Weight	Time	Weight	Time	Weight	Time
44x10	24.0	90′	23.6	90′	19.9	90′	18.8	90′	18.4	90′
42x10	23.3	90′	22.8	90′	19.4	90′	18.3	90′	17.9	90′
40x10	22.6	90′	22.3	90′	19.0	90′	17.7	90′	17.4	90′
38x10	22.0	90′	21.6	90′	18.4	90′	17.1	90′	16.8	90′
36x10	21.2	90′	21.0	90′	17.8	90′	16.6	90′	16.2	90′
34x10	20.6	75′	20.4	75′	17.2	75′	16.0	75′	15.6	75′
32x10	15.6	75′	15.4	75′	13.1	75′	12.0	75′	11.8	75′
30x10	15.2	60′	14.9	60′	12.6	60′	11.6	60′	11.4	60′
28x10	14.7	60′	14.3	60′	12.1	60′	11.2	60′	11.0	60′
26x10	14.2	60′	13.8	60′	11.7	60′	10.8	60′	10.5	60′
24x10	13.6	45′	13.3	45′	11.3	45′	10.4	45′	10.1	45′
22x10	13.1	45′	12.7	45′	10.8	45′	10.0	45′	9.7	45′
20x10	12.5	45′	12.2	45′	10.4	45′	9.6	45′	9.3	45′
18x10	12.0	45′	11.7	45′	9.9	45′	9.2	45′	8.9	45′
16x10	11.4	45′	11.3	45′	9.5	45′	8.7	45′	8.5	45′
14x10	10.9	45′	10.8	45′	9.0	45′	8.5	45′	8.0	45′
12x10	.....	.....	.....	.....	8.6	30′	7.9	30′	7.6	30′
10x10	.....	.....	.....	.....	.....	.....	7.5	30′	7.2	30′
9x10	.....	.....	.....	.....	.....	.....	.....	.....	6.8	30′
8x10	.....	.....	.....	.....	.....	.....	.....	.....	6.4	30′
7x10	.....	.....	.....	.....	.....	.....	.....	.....	5.8	30′
6x10	.....	.....	.....	.....	.....	.....	.....	.....	5.4	30′

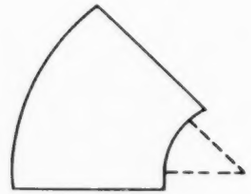
4	2.6	20′	5.1	20′	7.7	20′	10.3	25′	12.8	25′	15.4	30′	18.0	30′	20.5	30′

6x10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3.4	30			



Weight and Time for Vertical Elbows Cut D

Duct		7″		8″		9″		10″		12″	
Width	Gauge	Weight	Time	Weight	Time	Weight	Time	Weight	Time	Weight	Time
44	24	10.1	90′	11.8	90′	13.6	90′	15.5	90′	19.4	90′
42	24	9.8	90′	11.4	90′	13.1	90′	14.9	90′	18.8	90′
40	24	9.4	90′	11.0	90′	12.7	90′	14.4	90′	18.2	90′
38	24	9.0	80′	10.6	80′	12.3	80′	13.9	80′	17.6	80′
36	24	8.7	75′	10.2	75′	11.8	75′	13.4	75′	17.0	75′
34	24	8.3	70′	9.8	70′	11.4	70′	12.9	70′	16.4	70′
32	26	6.3	70′	7.4	70′	8.6	70′	9.8	70′	12.4	70′
30	26	6.0	70′	7.0	70′	8.2	70′	9.4	70′	11.9	70′
28	26	5.7	60′	6.7	60′	7.8	60′	9.0	60′	11.4	60′
26	26	5.4	50′	6.4	50′	7.5	50′	8.6	50′	10.9	50′
24	26	5.1	45′	6.1	45′	7.1	45′	8.2	45′	10.5	45′
22	26	4.8	40′	5.8	40′	6.8	40′	7.8	40′	10.0	40′
20	26	4.6	40′	5.5	40′	6.4	40′	7.4	40′	9.5	40′
18	26	4.3	35′	5.1	35′	6.0	35′	7.0	35′	9.0	35′
16	26	4.0	35′	4.8	35′	5.7	35′	6.6	35′	8.6	35′
14	26	3.7	30′	4.5	30′	5.3	30′	6.2	30′	8.1	30′
12	26	3.5	25′	4.2	25′	5.0	25′	5.8	25′	7.7	25′
10	26	3.2	25′	3.9	25′	4.6	25′	5.4	25′	7.2	25′
9	26	3.1	25′	3.7	25′	4.4	25′	5.2	25′	6.9	25′
8	26	2.9	25′	3.6	25′	4.2	25′	5.0	25′	6.7	25′
7	26	2.8	25′	3.4	25′	4.0	25′	4.8	25′	6.5	25′
6	26	2.7	25′	3.2	25′	3.9	25′	4.6	25′	6.2	25′
5	26	2.5	20′	3.1	20′	3.7	20′	4.1	20′	5.9	20′
4	26	2.4	20′	2.9	20′	3.5	20′	4.2	20′	5.7	20′



Weight and Time for Rectangular Angles Cut B

Duct	7″		8″		9″		10″		12″	
Width	Weight	Time	Weight	Time	Weight	Time	Weight	Time	Weight	Time
44	43.4	90′	42.9	90′	44.5	90′	45.1	90′	46.3	90′
42	39.9	85′	40.5	85′	41.1	85′	41.7	85′	42.8	85′
40	36.6	80′	37.1	80′	37.6	80′	38.2	80′	39.2	80′
38	33.4	75′	33.9	75′	34.4	75′	34.9	75′	35.9	75′
36	30.4	70′	30.9	70′	31.3	70′	31.8	70′	38.2	70′
34	27.4	65′	27.9	65′	28.4	65′	28.8	65′	29.7	65′
32	19.4	60′	19.7	60′	20.1	60′	20.4	60′	21.1	60′
30	17.3	55′	17.6	55′	17.9	55′	18.2	55′	18.9	55′
28	15.4	55′	15.7	55′	16.0	55′	16.3	55′	16.9	55′
26	13.5	50′	13.8	50′	14.1	50′	14.4	50′	14.9	50′
24	11.8	50′	12.1	50′	12.3	50′	12.6	50′	13.1	50′
22	10.3	45′	10.5	45′	10.7	45′	11.0	45′	11.4	45′
20	8.8	45′	9.0	45′	9.2	45′	9.4	45′	9.9	45′
18	7.4	45′	7.6	45′	7.8	45′	8.0	45′	8.4	45′
16	6.2	40′	6.4	40′	6.6	40′	6.8	40′	7.1	40′
14	5.1	40′	5.2	40′	5.4	40′	5.5	40′	5.9	40′
12	4.0	40′	4.2	40′	4.3	40′	4.5	40′	4.7	40′
10	3.1	35′	3.2	35′	3.4	35′	3.5	35′	3.7	35′
9	2.8	35′	2.9	35′	3.0	35′	3.1	35′	3.3	35′
8	2.3	35′	2.4	35′	2.5	35′	2.6	35′	2.8	35′
7	2.0	30′	2.1	30′	2.1	30′	2.2	30′	2.4	30′
6	1.6	30′	1.7	30′	1.8	30′	1.9	30′	2.0	30′
5	1.4	30′	1.4	30′	1.5	30′	1.6	30′	1.7	30′

A Filter Cleaning Service Bought by Hundreds of Filter Users

By Alvin Dyer
Manager, Air Conditioning, Heating and Ventilating Department

Utah Builders Supply Co.
Salt Lake City

Permanent filter stock room showing cleaned filters tagged with owner's name waiting for service date. Semi-permanent or cleanable filters are handled similarly.

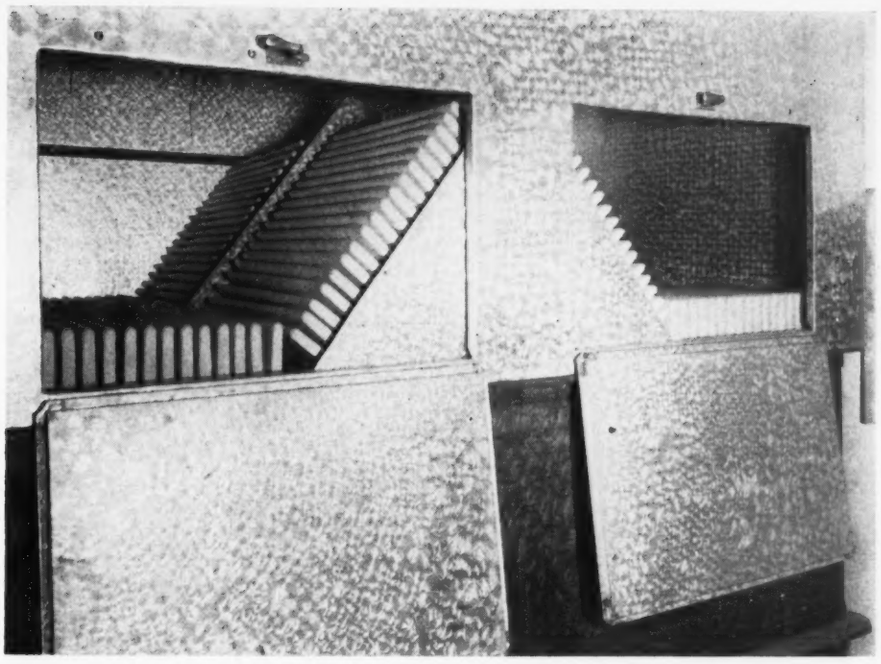
IN Salt Lake City, home owners and business firms are faced every winter with a severe local smoke problem, very detrimental to inside cleanliness. Since the inception of our business our firm has felt that something should be done to alleviate this condition—particularly among owners of residential or commercial air conditioning systems where means are provided through filters for removing practically all soot or dirt if the filters are maintained in serviceable condition.

We have long been convinced that if there is one phase of mechanical warm air heating and air conditioning generally overlooked, it is that of air filtration. Indirectly, the manufacturers are somewhat responsible for this condition. For example, not long ago, we held an elaborate display and convention, covering the projection of sales for a nationally known air conditioning firm, at which time we called in thirty or more of our representatives covering the intermountain territory. At this convention we had several units in actual operation. Among others was a three-ton, self-contained, air conditioning unit which, in the early summer, was the center of attraction. In going over the various features of this unit, we were forced upon every occasion to draw attention to the filters and it was evident to our customers and ourselves that a unit such as this, costing in the neighborhood of $1200.00 installed, should be equipped with a more effective filter than the one installed, the cost of which was $1.00. We directed this matter to the attention of the factory representative, and he stated he was certain that soon the manufacturing companies would be putting in more effective filters on these units.

We have approached the problem from the angle that there is nothing more important than good air filtration. The projection of this idea by our company has been vindicated so far as success is concerned, by the numerous testimonials of users of filters which we have installed, and users of the filter service which has been established for the proper care of these filters.

All Types of Filters Are Serviced

We sell many types of filters. Some are of the throw-away type; others are the semi-permanent type, and still others of the permanent (Annis) type, which have proven so successful in this territory. Regardless of the type of filter that is sold, a record is kept of the installation and a service card is made up, which carries such information as—the name of the purchaser, address, type of heating system, type of filters used in



Permanent filter (Annis) installation in a large residence just after the cleaned filters had been substituted for dirty units. Utah Builders Supply installed this entire heating system.

connection with heating system, and the date of the completion of the job. Thirty days from this date, an initial call is made by our service man and this automatically commences a period of filter service. It might be well to point out that when an original filter job is sold, whether it be on a warm air heating system, a filtration system, or an air conditioning system, the principle of filtration is thoroughly explained to the owner and provisions are then made in our service department to care for this installation so far as the filters are concerned.

In the case of permanent filters we always sell an extra set of filters so that when the first day of filter service arrives these duplicate filters can be installed in the place of the dirty ones to be removed which, in turn, are cleaned while the duplicate filters are in operation and so on to the next filter service date.

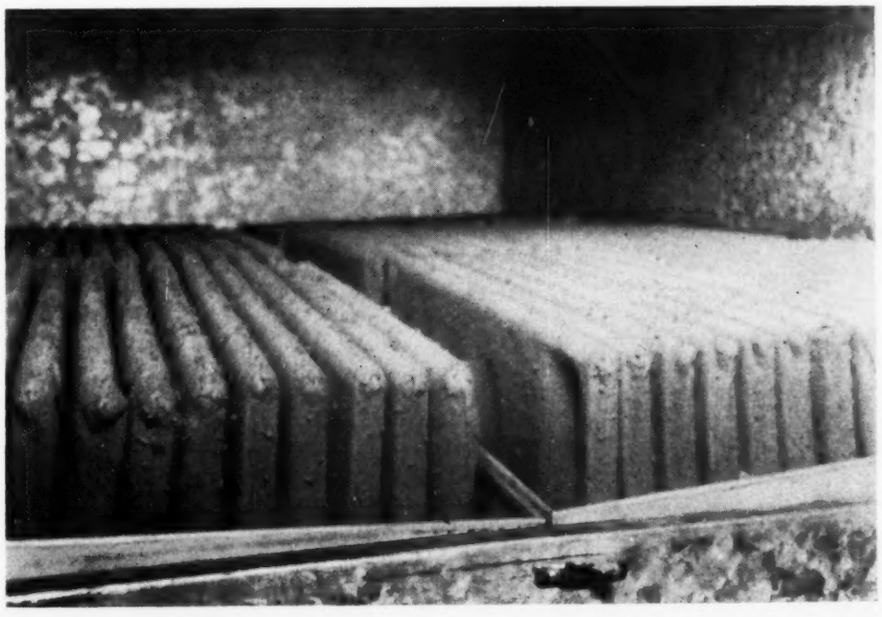
When using steel wool filters encased in a metal frame (a semi-permanent filter) we invariably sell two sets of filters so that while one is being serviced the other can be rendering its needed duty.

This program not only increases our sales on filters, but prepares the customer for service when the original sale is made.

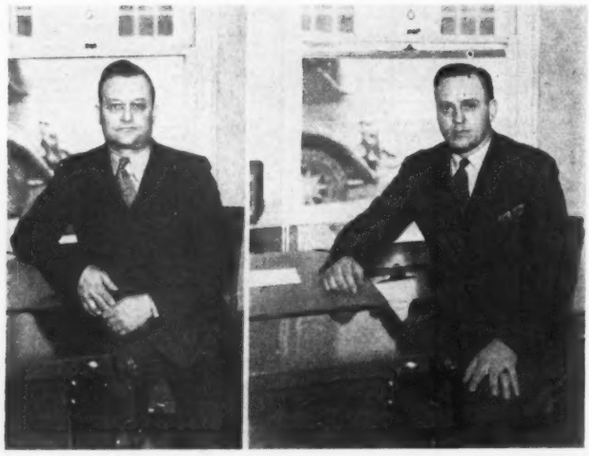
Other items which are attended to while the filters are being changed are—oiling the fan motor and mechanical apparatus in need of attention is carefully checked. All of this inspection and service is included in the cost of servicing the filters.

There is, of course, a charge made for servicing these filters, ranging from 25c to $1.00 depending upon the type of filter and the work required to make the necessary change. Many of our customers, such as the different railroads, the various bus companies and numerous other large local concerns, such as bank buildings, etc., with their own engineers and janitors, merely remove the filters from the job and have them ready for our service man to pick up and receive the necessary replacements. In such cases, the cost of servicing is greatly reduced. Ninety per cent of our filter servicing, however, is a complete service, involving the removal of the filters and replacing the dirty with new or re-cleaned filters and then repeating the service when the next date of service arrives.

The period of filter service varies with the type of filters used and also in accordance with the location of the residence or building in which the filters are installed. Some filters will maintain an efficient period of service for four weeks, others will continue for eight weeks, while some necessarily are serviced at two-week



Dirty filters on the day Utah Builders service man exchanged these cells for a cleaned set. Salt Lake City winter air does this to filters in from 2 to 4 weeks time.



Left—President Harold Anderson and right—Air Conditioning Dept. Manager Alvin Dyer, the men who established this service.

intervals. This, of course, is determined by our filter service man on his various calls.

Service dates are set up on our service cards so that when the service date arrives our attention is immediately called to each job. This is accomplished by having our various customers' service dates set up according to the days of the month, for example, when the first day of the month arrives we merely go to our card system and all of our customers who have their filters serviced on the first day of the month are immediately in evidence and the work of service is taken care of. This continues throughout the month.

Originally this system of service was offered only to our own customers, that is, purchasers of equipment which our company sold, but the acceptance has grown to such large proportions, that today we are extending the service to all filter users. Recently we completed a campaign wherein we have sent letters to all people in our vicinity who are using any type of filters, inviting them to make use of the filter service which we are operating. We are hopeful that this project will serve to increase the volume of filter service and thereby justify the effort being made to offer a filter service that will be in keeping with the standards for air conditioning.

The Low Income Owner Buys

We were told at the outset of our filter service that filters costing as much as the permanent filters we sell could never be sold to the man who lives in a small home. This theory we have disproved and we are now installing permanent filters at the rate of 600 and 700 per year in new residences, costing in the neighborhood of $4,000 to $8,000. All has not been easy sailing on our program, involving filters which sell for five times the cost of the ordinary filter included in the majority of blowers and air conditioning units today. The public, however, seems to appreciate the value of these filters and, consequently, sales resistance is reduced. Today the superiority of permanent filters properly serviced is acknowledged throughout our entire territory.

Overhead Records

(*Continued from page* 41)

Gradually this loss on Material and Productive Labor grew less and less, due to the careful use of the Job Record Sheets and checks and the Summary of Sales (jobs) each month. In most instances these two items now show (in Philadelphia shops) a slight first cost profit as shown in the Shop 1 statement.

The loss on Expense (overhead) now seems to be the hard problem to overcome. Yearly overhead robs part or all of the profit asked, but it, too, is becoming less due to methods the shop owner has in checking it. For instance, some shops find an "average overhead" for the year from two, three or more previous years, and then divide this average overhead by 12 which equals a "monthly overhead." When poor months do not cover this average overhead the fact is noted and the overhead percentage is raised during the busy months to make up the loss.

This has worked very well in shops using the Monthly Sales Summary Sheet, which is merely a seven column sheet on which is entered by consecutive numbers each job as it is completed and figured showing the three costs—Material, Labor, Expense; Profit and Sales Price of the bills. Each column is totalled at the end of the month to show the number of jobs completed during the month and the amount of money recovered during the month plus the profit and total sales. A common expression now heard is: "Well, I have covered my Overhead up to date," or, "I am about $100.00 (or other figure) behind (or ahead) of my Overhead."

[Part 2 will follow]

Brewery Modernization

(*Continued from page* 34)

The exhibition value of this equipment was furthered by the brew house tradition to give all equipment a lustrous polish for reasons of appearance as well as cleanliness.

Mr. A. Striberny, plant superintendent of Schock, Gusmer & Co., advised that polishing the nickel kettle dome involved the use of #120 and #180 grit, employing Tampico wheels for a satin finish. A high mirror finish was applied after complete assembly at brewery. Welds were ground with emery wheels and bright finish was imparted by flannel wheels and #180 grit, electrical hand wheels being used. He also pointed out that nickel work was welded with #41 nickel, gas welding wire. The Monel parts were welded with #40 Monel gas welding wire. The Nickel-Clad steel welds were made with #135 Nickel metallic arc welding rods. Torch welding was employed in the first two instances and electric arc welding for joining the Nickel-Clad steel.

Recycling

REDUCES SERVICE CALLS

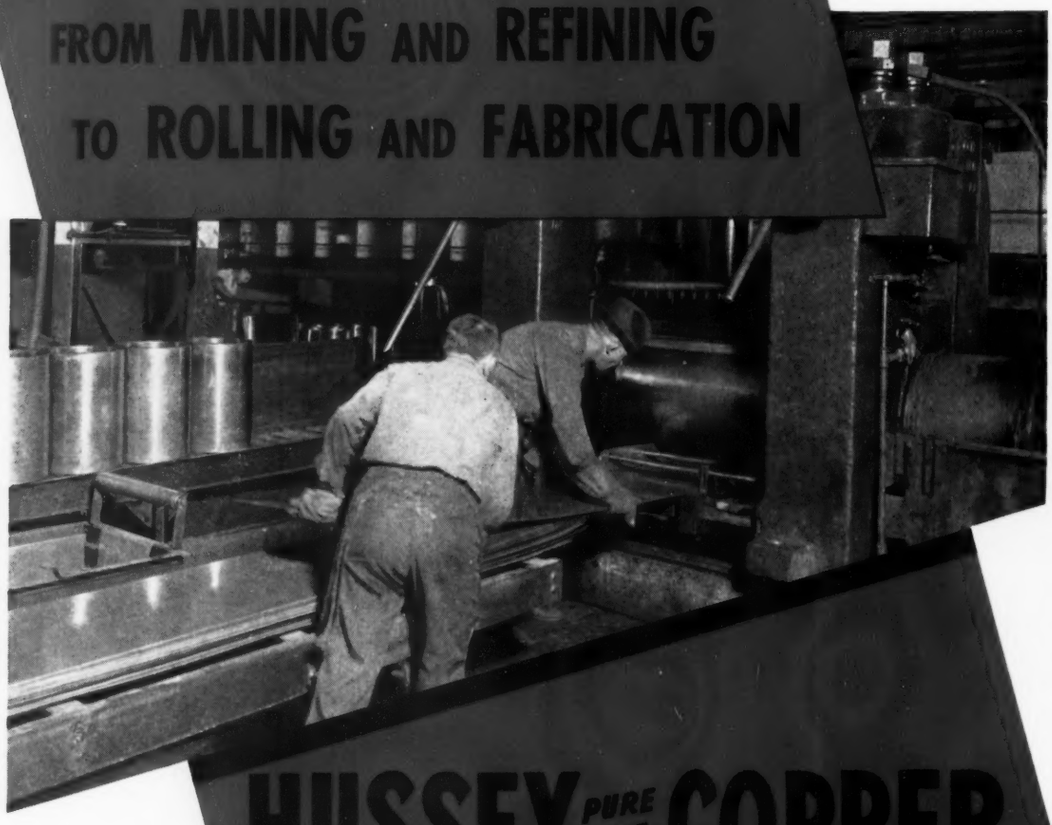
THE *Symbol* OF THE NEW AUTOMATIC HEATING

MINNEAPOLIS - HONEYWELL Re-cycling Protectorelays give your burner a second chance to start at the beginning of the firing cycle should the first attempt fail. Further, in the event that the burner should stop before the room thermostat or limit control is satisfied, this type of relay provides one automatic start before going "on safety." This saves those costly service calls where it is only necessary to "push the button"—of primary importance in freezing weather or if the occupants of the home are away. The Series 10 circuit makes possible recycling in the relay, and the exclusive "heat acceleration" feature in the thermostat, thus providing minimum service costs to you and maximum comfort, convenience and economy to your customers. Complete Minneapolis-Honeywell equipment—Acratherm, Re-cycling Relay and Limit Controls—are an assurance of oil burner satisfaction, and are the symbol of the new Automatic Heating. Dependable controls cost less than service. Depend upon controls bearing the M-H Symbol. Minneapolis-Honeywell Regulator Co., 2726 Fourth Ave. South, Minneapolis, Minnesota. Branches Everywhere.

MINNEAPOLIS-HONEYWELL *Control Systems*

BROWN INDUSTRIAL INSTRUMENTS

UNDIVIDED RESPONSIBILITY FROM MINING AND REFINING TO ROLLING AND FABRICATION



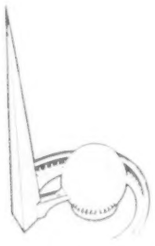
HUSSEY PURE LAKE COPPER

"The Enduring Copper"

When you specify Hussey Copper, you get the advantages of controlled quality and low costs made possible only by the 100 per cent control of its production from the rich, natural copper fields of the Great Lakes region to the final finishing operation in the modern Hussey Copper Rolling Mills at Pittsburgh.

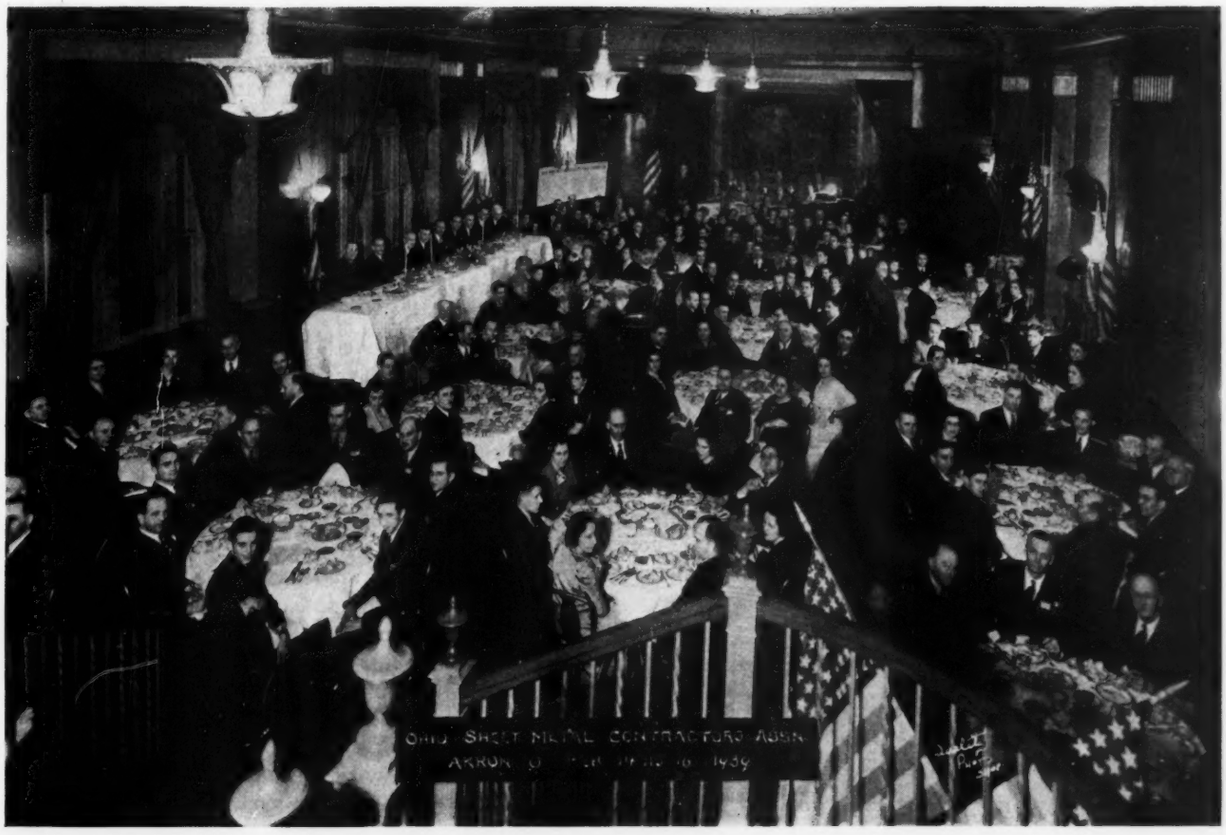
Rolled in one of the largest copper rolling mills in the United States, Hussey Copper is readily available in any quantity to meet your delivery requirements through seven large completely stocked Hussey Warehouses located in the principal industrial centers. Make Hussey your Copper Headquarters during 1939.

C. G. HUSSEY & COMPANY
(Division of Copper Range Co.) PITTSBURGH, PA.



When you visit the World's Fair, be sure to see the educational exhibit sponsored by the Copper and Brass Industry in the Metals Building.

Copper **HUSSEY** *Brass*



Optimism Is Keynote of Ohio's 25th Annual Convention

OPTIMISM was the keynote of the 25th annual convention of the Ohio State Sheet Metal Contractors Association, held at the Portage Hotel, Akron, February 14, 15, 16, 1939. Attendance was larger than for some time past and it was reflected in the discussion following the presentation of the various papers.

The opening day was given over to registration and various committee meetings. President Lauer of Columbus appointed F. W. Mirick of Columbus and J. Jacobs of Cincinnati to the Auditing Committee; Harvey Hazlet of Columbus and Charles Lentz of Canton formed the Nominating Committee; and Henry C. Bitter of Toledo and H. C. Fravel of Canton were named to the Resolutions Committee.

Gas for Fuel

After the usual greetings from Hon. Lee D. Schroy, Mayor of Akron, and response by State Secretary Gundlach of Sandusky, President Lauer introduced R. M. Connor Director of American Gas Association Testing Laboratories who described in detail the possibilities of gas for fuel. He defined the different types of heating and then discussed the cast iron and steel furnace markets. He told of the A. G. A. specifications for gas fired furnaces and the controls which must be used on such installations. Mr. Connors felt that winter air conditioning had a bad start in some sections, because of some representations of warm air heating as air conditioning, and on gas fired jobs urged the trade to follow A. G. A. specifications for forced air heating.

Among distinguished guests introduced to the convention at this time were Joseph J. Walter, Ottawa, Ill., President of the Sheet Metal Contractors of Illinois, as well as C. A. Olson, Vice President of the National Warm Air Heating and Air Conditioning Association.

Ohio Sales Tax

Winters Sampson of the Ohio Sales Tax Commission told the Convention of the theory and practice of taxation and pointed out that the Ohio Sales Tax was the result of constitutional changes in Ohio, which made the State Government pass the Sales Tax legislation to finance new obligations of the State, such as Old Age Pensions, Unemployment Insurance funds, etc. Sheet metal contractors

doing business in Ohio fall into two classifications for sales tax purposes—dash retail establishments in connection with contracting work, and those without retail establishments.

Sales taxes collected from the first class of establishment are based on over the counter sales to the consumer, as well as on items fabricated and sold to the consumer, on which the tax is based on cost of materials used. Taxes from the second class of establishment are based on the price of materials which are fabricated and sold to the consumer. In all cases the Ohio Use Tax is obligatory on materials purchased outside the State of Ohio. Tax is also collectable on purchases of personal tangible property which become real property when installed.

On time and materials contracts Sales Tax can be collected from owners. On a lump sum contract tax cannot be collected. Any work on contract for any religions, charitable or political subdivisions of the Federal Government are exceptions.

Business Men Should Enter Politics

Hon. Arthur Lamneck, former congressman from Ohio, made a stirring address on "The Problems of the Businessman Today."

More business men should enter politics in an effort to operate this country on a business-like basis, he told the contractors.

Furnace Air Conditioning

Fred R. Bishop, representing the National Warm Air Heating and Air Conditioning Association, described in great detail "Furnace Air Conditioning." Mr. Bishop read at length from "Winter Air Conditioning: Forced Warm Air" by S. Konzo, giving definitions as to what constituted a winter air conditioning system. He talked about selling comfort rather than air conditioning or temperature. He quoted the ASH&VE Guide on what physiological factors were involved to make for the more comfortable living of man. He went into the effect of cold walls, insulated and non-insulated structures, the use of single windows vs. double windows, and the location of the thermostat (the lowering thereof to get into the comfort zone quicker and to get away from cold 70). He referred again to the ASH&VE comfort chart for proper humidification, but pointed out that such humidification was still dependent on the class of construction. He spoke of the necessity for clean filters at all times. He spoke of the new devices on the market which would act as a warning signal when filters became clogged.

Prefabricated Ducts and Fittings

With Vice President Oscar Hodgson of Barberton presiding P. S. Miller, President Lamneck Products, Inc., of Columbus spoke on "Progress in Prefabricated Ducts and Fittings." Mr. Miller confined his remarks to Prefabricated Ducts and Fittings in general, and the profit that might accrue to the contractor through their use. He called attention to the original research work on friction, velocities, equivalents, etc., allowing a margin of safety in performance data for unusual conditions and even perhaps for careless field installation. The register and grille manufacturer has tested his product for data to assist the designer; and though slightly belated, the prefabricated duct and fittings manufacturer has designed and is presenting performance data for the designer, the architect, the wholesaler and the installer which guarantees product performance.

Mr. Miller likened the air conditioning unit to the heart and duct system as the arteries. Obvously, the connecting link between unit and register may ruin the finest of air conditioning installations. While the distribution system is really the controlling factor assuring the success or failure of the air conditioning unit, its performance in installation was never a certainty. The manufacturer guarantees overall performance of the heating unit, hopeful of the fairly competent installation of the entire job. If the unit manufacturer, his wholesaler or his heating contractor had distribution systems available of known qualities, said Mr. Miller, they could make a complete layout for a residential installation, the manufacturer could ship his units and specify a duct system with predetermined confidence—a standardized distribution system having known performance.

During the past four years prefabricated duct and fittings have gone through the wash and emerged as an accepted standardized answer to the installation and sales problem, declared the speaker. The number of items to complete a stock have been reduced to a minimum and the investment greatly reduced. Fittings have been redesigned, tested, checked and re-checked by the foremost engineers in the heating industry. These fittings are now produced to perform a given job and to be used with a standard trunk line depth. Wall stack sizes have been reduced to standard depths. Costs have been persistently lowered as a result of this standardization.

Mr. Miller summarized by saying that prefabricated ducts and fittings have been and will continue to be further standardized; "field failure" should dwindle to a minimum as performance is known; predetermined cost and profit are definitely known; standardization has made possible universal stocking; use will permit greater unit sales; more organization time to be spent for selling; and their use will reduce material, labor and installation costs and thereby create greater profit.

Pattern Development

L. Coulter Pierson of American Rolling Mill Co. introduced Ralph W. Poe, secretary of the Illinois State Association, who spoke of "A Short Method of Pattern Development." Mr. Poe explained that his idea might be termed a "roll out" method and consists of visualizing and making galvanized iron half sections of the item which are then "rolled out" on black paper and when doubled furnish the proper pattern.

The Sheet Metal Market

John Love, Industrial Editor of the Cleveland Press, told of his talking to economists and statisticians for the past three months and based upon those talks, the market for sheet metal work and warm air heating in 1939, should reach 500,000 single houses. The period 1939-1940 should see over 1,000,000 homes of all classes built. This he explained was due to a swing upward in the cycle of home building which had been carefully charted for a period of years. He reported that furnace manufacturers had as good a year in volume in 1937 as in 1929 and cited the Census of Manufacturers as his authority. He reported that furnace volume for 1938 was only slightly lower than 1937. He cited the tremendous trend toward winter air conditioning, with its increased demand for sheet metal, and made the statement that the present-day winter air conditioning furnace was using three times as much sheet metal as the former gravity furnace.

Love predicted that the entire country was just entering a real sheet metal age and that the benefits therefrom would naturally accrue to the sheet metal contractor, because he would get a larger proportion of the building dollar. The development of a better steel house would also benefit the sheet metal contracting industry to a marked extent. Love pointed out that the Clairton Development for the United States Steel Corporation uses more sheet metal than any other development, except the all-steel house. The houses were built of conventional design, but the architect and building contractor used sheet metal wherever possible, with the result that the sheet metal contractors on the job got more of the building dollar. Love insisted that air conditioning has not displaced any other industry. Nor had it caused any decentralization as was the case with the tire industry. He said that the potentials in residences for sheet metal were equally as good as in the automotive industry. The home of today and tomorrow will concentrate on making the three workshops of the home—the kitchen, bathroom and basement—more practical from a living standpoint and would continue to be the only parts of the house that the builder could really "sell."

Mr. Love insisted that any predictions would have to be "weighted" by external causes, such as a general European war or inflation at home. The threat of inflation at home became more apparent because of government spending. However, this was tempered by the fact that everyone had come to think of building as a hedge against inflation When, as, and if the European situation is settled, one of the bottle necks is bound to be skilled labor. The supply of skilled labor may not be nearly adequate to meet the demands of industry. With all these weighting factors, business volume in general for 1939 should be at least ten per cent better than 1938.

OFFICERS RE-ELECTED

President	**Wm. Lauer, Columbus**
Vice President	**Oscar Hodgson, Barberton**
Treasurer	**W. E. Feiten, Cleveland**
Secretary	**Carl H. Gundlach, Sandusky**

Directors:

A. E. Bogen	**Columbus**	**Chas. Grote**	**Cincinnati**
J. Dersher	**Toledo**	**H. L. Orton**	**Akron**
D. A. Mannen	**Cleveland**	**Clarence Christen**	**Toledo**

Flashing and Flashing Reglet

A Cheney, President of the Cheney Company, discussed at some length "Ten-oz. Three-Way Flashing and 16-oz. Flashing Reglet." He pointed out that this new development would definitely broaden the scope of the sheet metal contractors' activities in the larger structure field.

USS Technicolor Movies

The Technicolored Movies of the United States Steel Corporation were shown to the delegates, guests and the ladies and were exceptionally well received.

Selling Controls

W. R. Moore, Cleveland Manager for Minneapolis-Honeywell, gave an inspiring talk on the proper selling of controls. He pointed out the real sales possibilities offered by off-season selling of such controls, but that the dealer to make such sales must *have* them, *know* them, *tell* them and *sell* them. Units which deserve the dealer's confidence, so that he may better sell them should have long life, must be well known with a real public acceptance to lessen sales resistance, be correctly designed, and backed by manufacturers with adequate engineering and research staffs.

Moore stated that controls should be sold by the dealer, not only on new furnaces and winter air conditioning units, but also on older heating equipment, thereby creating a "plus" sales market for the dealer.

Moore stressed the dealer's sales possibilities in the replacement market and gave detailed figures from his own operation in Cleveland to substantiate his claim that the dealer who would do the proper kind of selling job in such a market would be amply rewarded with a real profitable operation.

Social Security

A representative of the Akron office of the Social Security Board talked on the Old Age provisions of the act and answered many questions from the floor.

J. Walter, President of the Illinois Association, on request from the chair, told the convention that goods and services natural to the sheet metal industry should be sold by the sheet metal contractor only and that jobbers and manufacturers or any source of supply should have a sales policy which protects the sheet metal contractor all of the time on all goods and services.

(*Continued on page* 102)

Toledo Code

(*Continued from page 47*)

tion of this ordinance or rules of the Director of Public Safety. (Sec. 10).

Cost of License and Renewal

Section 111. The original license fee shall be TWENTY-FIVE DOLLARS ($25.00). Renewal of license shall be issued to contractors upon the payment of an annual fee of TEN DOLLARS ($10.00). (Sec. 8).

Section 112. Any person, firm, or corporation upon conviction of violation of any provision of this ordinance, shall be deemed guilty of a misdemeanor and shall be fined not less than $5.00 nor more than $500.00. Each violation of any provision of this ordinance shall constitute a separate offense. (Sec. 11).

Permit Requirements

Section 113. It shall be unlawful to proceed to remodel, install, or change a warm air furnace or piping within the City of Toledo, without a permit having first been obtained from the Commissioner of Inspection. (Sec. 14).

Inspection Fee

Section 114. The Inspection Fee for a replacement of a Warm Air furnace or alteration of a Warm Air Heating System shall be TWO DOLLARS ($2.00). (Sec. 13).

Section 114-A. The minimum inspection fee for a complete Gravity Warm Air Heating System shall be THREE DOLLARS ($3.00). This rate shall apply on systems requiring 75,000 B. T. U. per hour, or under. An additional fee of $.50 shall be added for each 25,000 B. T. U. per hour or fraction thereof required in addition to 75,000 B. T. U. per hour. (Sec. 13).

Section 114-B. The minimum inspection fee for a Forced Air or Mechanical Warm Air System shall be THREE AND 50/100 DOLLARS ($3.50). This rate shall apply on systems requiring 75,000 B. T. U. per hour or under. An additional fee of $.50 shall be added for each 25,000 B. T. U. per hour or fraction thereof, required in addition to 75,000 B. T. U. per hour. (Sec. 13).

Preliminary Inspection

Notice To Be Given By Contractor, When

Section 115. It shall be the duty of the Commissioner of Inspection and his regularly authorized assistants to inspect all warm air furnaces hereafter installed or constructed. (Sec. 15).

Section 115-A. Inspection of new work shall be made as follows: When such work has proceeded to where the stacks to upper floors and heads for all side wall registers have been installed and boots have been connected, the contractor for this work shall notify the Commissioner of Inspection, who shall make, or, cause to be made, an inspection of such work. Upon finding that the work complies in all respects with the terms of the code, there shall be affixed by said inspector or his representative, to each stack or register head, a certificate stating that the workmanship and materials comply with the requirements of these rules. (Sec. 15).

Final Inspection

Section 115-B. Final inspection of plant shall be made after the whole is connected up and ready to operate, but before any fire has been started. (Sec. 15).

Section 115-C. No person shall lath and/or plaster or cover up any warm air heating work before such work has been inspected and certificate above referred to has been attached. The division of building inspection shall have the right and authority to remove or order removed all such lath, plaster, or other covering which may have been placed over such work before same has been inspected. The person, firm, or corporation ordering or causing such work to be covered up as herein set forth, will be subjected to the penalties set forth in Section 11 of this Ordinance. (Sec. 15).

Power of Director of Public Safety

Section 116. The Director of Public Safety delegates the power to issue permits to the Commissioner of Inspection. (Sec. 3).

City Board of Warm Air Heating

Qualifications—Vacancies

Section 117. The Director of Safety, with the approval of the City Manager, shall appoint a City Board of Warm Air Heating as an advisory Board to the Safety Director, consisting of the Commissioner of Inspection, and the chief of the Fire Prevention Bureau, and Three (3) other members who shall be appointed by the Safety Director, citizens of Toledo, actually engaged in the Practice and/or business of Warm Air Heating. Vacancies shall be filled by the Safety Director with the approval of the City Manager. (Sec. 4).

General Provisions (Plans)

Approval Of Plans Required, When

Section 201. Before the construction or replacing of any work shall begin, or a permit issued therefore, a suitable sketch of all work proposed to be done shall be filed in the office of the Inspector, by the Licensee or agent of the Licensee. If the sketch is not made satisfactorily, the Inspector may require full and complete plans drawn to scale.

Section 202. Every sketch must be accompanied by plainly written and well defined specifications or description of such sketch on the same form.

Section 203. The sketch and specifications exhibiting the work proposed must conform to these rules before they can be accepted by the Inspector.

Section 204. Sketch and specifications in accordance with these rules will be approved, and if not in conformity thereto, will be rejected within a reasonable time from date of filing. In case of disapproval, the person filing the sketch will be notified, stating the reason of such disapproval.

Section 205. Upon approval of the sketch and specifications by the Inspector, a permit for the work shall be issued.

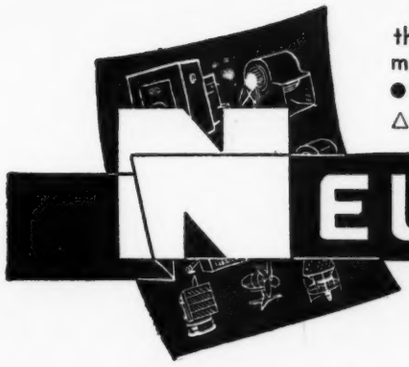
Section 206. No change or modification of an approved sketch and specifications shall be permitted unless such change or modification be authorized by the owner and Licensee; changes must be submitted to the Inspector and approved and placed on file, as in the case of the original sketch and specifications.

Section 207. When an application for a permit is made for a mechanical or gravity warm air heating system or for altering or adding additional duct work, a layout of the floor plans of all floors to be heated, and living quarters not heated, must be made. A rough sketch prepared at the time of application is sufficient if the dimensions and descriptions are accurate and well defined. The sketch may be prepared in advance of the application for permit. The floor plan shall show building construction, dimensions of individual rooms, ceiling heights, dimensions of windows and doors, insulation, type, and where located, whether attic is floored, partially floored or not floored, and whether full or part basement. It shall show location of furnace, location and size of warm and cold air ducts and registers and boxes. Information must be noted as to double glass or storm sash, capacity rating of heating unit, total load connected, type of fuel, whether conversion or fuel designed, type of automatic controls and whether duct system is individual or trunk line on mechanical systems.

Tests of Warm Air Furnace Fan Installations

Section 208. After notifying the Division of Inspection, as hereinbefore provided, that any newly installed warm air furnace fan system, or portion thereof, is ready for inspection and test, the contractor installing same shall, in each case, make such test, in the presence of and under the supervision of the inspector from said Division as may

(*Continued on page 106*)



NEW PRODUCTS

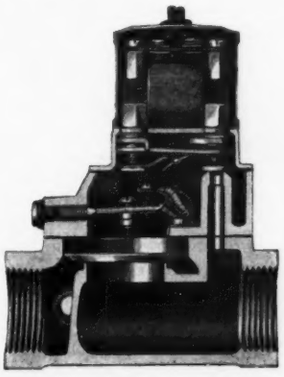
For your convenience a number has been assigned each item. Check the items in which you are interested on the coupon on page 95 and mail to us.

● Indicates product not listed in 1939 Directory.

△ Indicates product and manufacturer not listed in 1939 Directory.

18—Slow Acting Gas Valves

Julien P. Friez & Sons, Division of Bendix Aviation Corporation, Baltimore, Maryland, announces new slow-opening type gas valves. These valves provide a soft ignition at low flame followed by a gradual opening to full flame. They incorporate a snap pri-



mary flow of adjustable volume, a hesitation period, allowing time for uniform draft to be established, followed by slow opening to full capacity. The closing cycle is snap-acting.

These valves are made in two sizes —¾ in. and 1 in. Pipe Tap—and operate on 20 volts.

◆

19—Bankheat Burner

The S. T. Johnson Company, 940 Arlington, Oakland, California, announces a new Bankheat model burner of the pressure atomizer type, with complete set of controls—room thermostat, master control and furnace limit control.

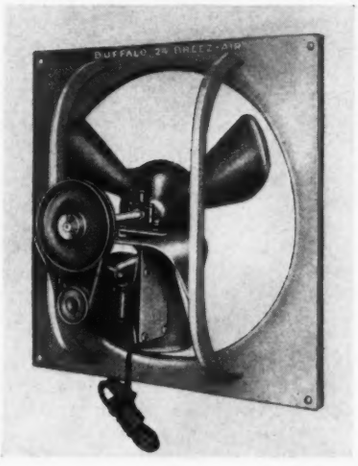
The firing assembly and fan are easily accessible. High tension transformer connection to ignition cable is completely enclosed within the burner. There is a Pyrex inspection hole in the cover.

This new model has been redesigned and improved, with high blast tube mounting, in three sizes, with capacities from .8 to 7½ gals. per hour.

◆

20—1939 Breez-Air Fans

The Buffalo Forge Company, Buffalo, N. Y., announces several changes in the Breez-Air line for 1939. Of these, the most important to the distributor and dealer is the new square panel with which all Breez-Air fans up to the 54-inch will be supplied. Of heavy gauge steel, the panel has flanged edges which make it easy to install in a penthouse or opening in the wall. The 24-, 30- and 36-inch sizes will be supplied with newly developed type of motor mounting attached to the panel at four points. The 42- and 48-inch fans will retain their

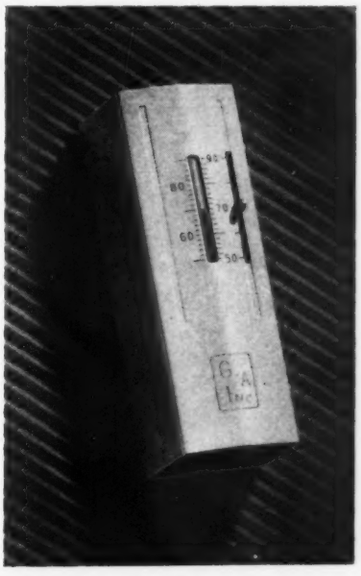


three-point mounting on the heavy angle rim to which the panel will be bolted.

The 54-inch fan which is normally installed only in large residences will be furnished with heavy angle iron ring with three point tripod mounting as in the past.

An entirely new line of fans to be known as Industrial Breez-Air fans are also offered for 1939. These feature increased fan speeds with larger motors and of course increased capacities. They are not satisfactory for residential operation from a noise standpoint but are entirely suitable for stores, amusement places and industrial service.

Both lines will be sold through Breez-Air distributors.



21—Single Thermostat

Gleason-Avery, Inc., Auburn, N. Y., announces a new single G-A Thermostat in the low-voltage field—a carefully engineered, precision instrument with a single temperature scale for both reading and setting. There are no separate dials to read.

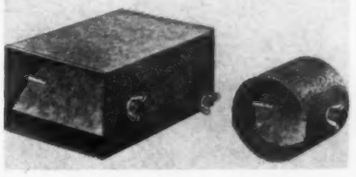
This G-A Thermostat is extremely sensitive. It provides immediate response to temperature changes—sensitive to limits of 1 degree.

G-A Thermostat's satin, gilt finish harmonizes with any interior decorative scheme. Each instrument is carefully tested and calibrated before leaving the factory.

◆

● 22—Damper Control

Goese Manufacturing Co., 2548 North 18th St., Milwaukee, announces the Goese cold rolled steel bearing, time saver damper control with cad-



mium finish. There are three parts: the tail piece, threaded stud and wing nut including four rivets. The screw slot on threaded stud shows position of the damper.

Rivets can be driven or drawn through damper. Marking and punching of damper is eliminated.

New Products . . . . . .

For your convenience in obtaining information regarding these items, use the coupon on page 95.

△ 23—Metal Awnings

G. A. Houseman, 207 Milam St., Shreveport, Louisiana, has invented and patented a new type of metal awning that provides shade and allows air circulation. They exclude sun and rain, but permit circulation of air and indirect infiltration of light. This is accomplished by overlapping-channels with the under ones, thus providing drainage and the spacing between affording light and ventilation, which is also added to by the angular side louvre.

The metal awning is simple in construction and is being made in sheet metal shops with few tools and small investment. Installation is easily made with a hammer, pliers and screw driver.

Mr. Houseman is promoting and selling manufacturing rights with royalty, or patent grants outright sale, throughout the United States.

◆

△ 24—Combustion Chamber

Harry E. Gilbert & Son, 11 Brooklawn Terrace, Bridgeport, Conn., offers the Gilbert radiant combustion chamber for oil and gas fuel.

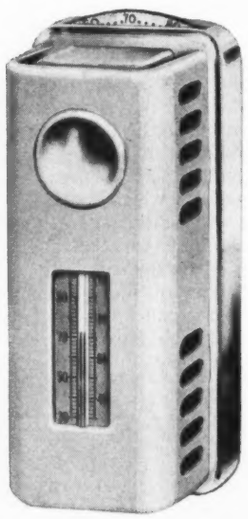
The standard chambers are made of ten segments of Neutrolite which can be formed to fit any type of furnace or boiler. When used in a round-fire chamber, they are formed in the shape of a dome, perforated extensively to allow gases to escape while retaining the heat. For use in a fire-chamber that is long, they are formed into a dome-shaped tunnel with closed ends.

The manufacturer claims that these chambers have been designed for the greatest possible utilization of the heat developed from combustion of the burning oil, and that 20 to 30 per cent of fuel is saved.

◆

25—Hydraulic Action Controls

Julien P. Friez & Sons, Division of Bendix Aviation Corporation, 4 N. Central Ave., Baltimore, Maryland, announces a new line of high voltage room thermostats, oven controls and



space thermostats. These new controls feature the "Hydraulic Action" principle. Solid liquid charges, from which all gases have been excluded, actuate the switch contacts so powerfully that extremely high loads can be carried accurately and without relays (25 amperes at 120 V., A. C.).

A variety of types is available to cover the heating and cooling requirements of public buildings, offices, factories, storage vaults, incubators, ovens, unit heaters and coolers and all other commercial and industrial applications.

△ 26—Air Booster and Conditioner

Wayne Automatic Relay Co., Fort Wayne, Indiana, announces the Wayne air booster unit, especially designed for use in connection with warm air, gravity-flow heating systems using wood, coal, coke, gas or oil.

The principle is simply to increase the air circulation by drawing it down one of the cold air ducts and then to clean it of dust and dirt by having it pass through an Owens-Ford Fiberglas filter. The air is then divided by means of a diversion plate, forcing the air upwards and around the bonnet of the furnace and in turn over the entire hot air circulating system.

This unit moves either 900 or 1,450 cfm by means of a heavy pitch non-rusting, overlapping 12 in four-blade fan. The fan is mounted on live rubber to insure quiet operation.

◆

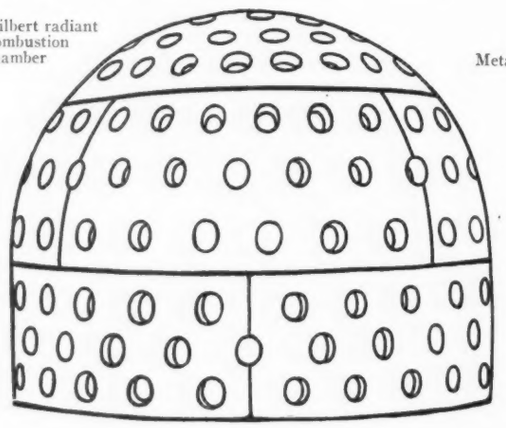
27—Metalbestos

William-Wallace Company, 160 Hooper Street, San Francisco, manufactures a pipe known as Metalbestos for installers of gas appliances. It is used as a vent or flue for carrying off the products of combustion from the appliance outlet to the outer air. It is approved by Underwriters Laboratories Inc., Pacific Coast Building Officials Conference and by municipalities.

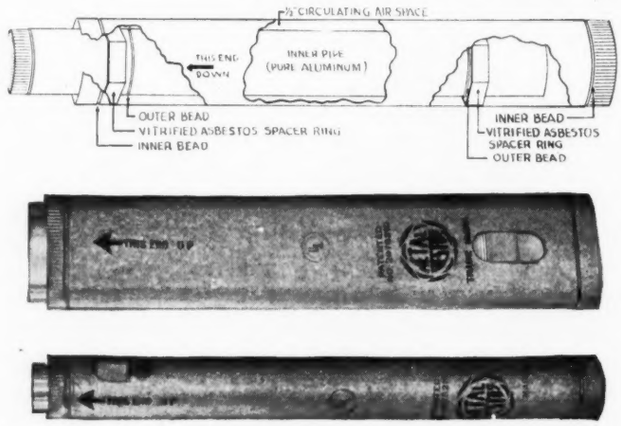
Metalbestos consists of an inner pure aluminum pipe assembled within an outer galvanized steel casing of one inch larger diameter than the aluminum pipe. The inner member is held in a centered position with relation to the outer by use of vitrified asbestos spacer rings which are so shaped as to allow a free flow of air in the one-half inch space between the two pipes thereby affording a circulating air space completely around the aluminum inner pipe. As pure aluminum is resistant to the action of condensates from burnt gases Metalbestos will last indefinitely.

Metalbestos is made in three feet and ten feet lengths and in all standard diameters of round pipe. Several sizes of oval pipe for use in partition spaces are also furnished as is a full line of fittings for both round and oval pipe. Metalbestos is covered by U. S. Letters Patent No. 2013193 and 2076210.

Gilbert radiant combustion chamber



Right: Metalbestos pipe



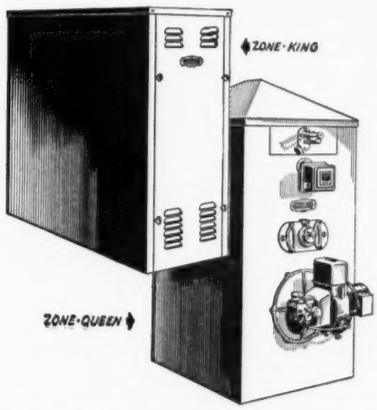
New Products . . . . . .

For your convenience in obtaining information regarding these items, use the coupon on page 95.

28—Zone King and Queen

Century Engineering Corp., Cedar Rapids, Iowa, announces the new Century Zone King and Zone Queen automatic oil burning gun-type units, popularly priced.

The Zone King filters, heats, humidifies and circulates conditioned air through the home, and provides a constant and reliable supply of clear, clean hot water for all domestic purposes. Recommended Btu output at the bonnet is 110,900.



The Zone King circulates cool night air in summer if installed with outside air intake. It may be used with either deep well or compressor type cooling systems as desired.

The Zone Queen is a gravity type furnace unit with the same basic primary and secondary furnace design. It is not equipped, however, with the blower and filter compartment. It does contain the same type burner, combustion chamber, water heating coil, humidifier, primary controls and the same quality materials. The basic difference lies in the method of air circulation and in the casing design. Recommended Btu output at the bonnet is 104,120.

◆

29—Colalloy

Colonial Alloys Company, E. Somerset, Trenton Ave. & Martha Sts., Philadelphia, announces Colalloy, a non-ferrous silvery metal, lighter than steel and most common metals, said to be unusually resistant to corrosion, outstanding in electrical and thermal conductivity, strong, workable, and low in cost.

This metal is made in all the forms, shapes, gauges and range of sizes that are available in most common metals.

The properties of Colalloy are highly desirable. Its salts are colorless, odorless, non-toxic, tasteless, and non-contaminating even to delicate foods and materials. Colalloy will not rust.

For its physical properties, Colalloy has a range of hardness, tensile strengths, working factors and other properties, which make it an all purpose metal. It lends itself to common fabrication practices.

The natural appearance of Colalloy is silvery, but it is also available in Chromaloy, Satin and other surface effects, with high mirror-like chrome, or smooth non-reflective appearance.

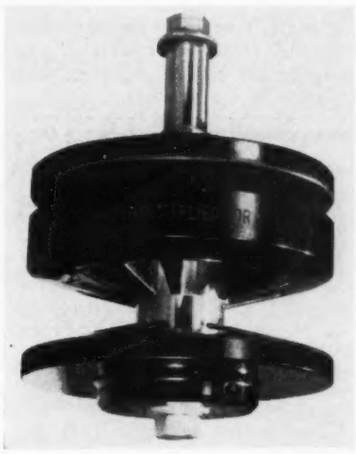
Free laboratory testing samples can be had by request.

◆

● 30—Speedmaster Drive

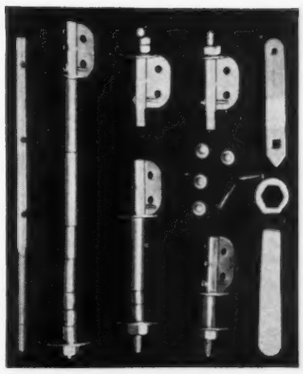
Continental Machine Specialties, 1301 Washington Ave., Minneapolis, announce an improved design and lower price for their Speedmaster variable speed pulleys. These new infinitely variable speed pulleys are moulded of solid high impact strength bakelite, accurately trued and balanced before final assembly. An improved pressure lubricated bronze sleeve allows the splined center sheave member to operate freely, regardless of load or speed.

The new construction is available in



two sizes, a 3½ in. diameter for drives up to ½ HP and a 6½ in. diameter for drives up to 3 HP capacity. The pulley is flexible in its adaptability to both "straight line" and "angular" drives. Interposed between motor and driven unit, the position of the pulley can be changed to vary the center distances of the Speedmaster pulley in relation to the drive and driven sheaves. The belts thus assume smaller or larger operating pitch diameters through the action of the variable pulley faces. Control of speed is made through a quick action lever, or a handwheel allowing control of speed within 1 RPM. The entire unit is free floating so that belt alignment is accurately maintained.

Advantages claimed by the manufacturer for the improved Speedmaster are: a six-to-one up to a forty-to-one ratio of infinitely variable speed, the use of standard "V" belts, and long belt and pulley life.



△ 31—K-B Damper Control

G. L. Kerentoff, 2803 Jefferson Ave., Cincinnati, announces the K-B damper control. The maker claims that any damper installed with the control can be rotated within the duct—be it square, round or rectangular—360 degrees.

The rod holders are separate from the rod and are riveted on the damper. This rod is then inserted either from inside or outside the duct, into the rod holder, and held in place by a substantial cotter key of the split type. A large washer and nut is then placed on the dial end, and a washer and double jam nut on the tail end. No dial is necessary because the rod is notched to show the true position of the damper.

◆

● 32—Diamond H Thermostat

The Hart Mfg. Co., Hartford, Conn., announces a new thermostat for water heaters, or the heat control of other liquids which must be maintained at temperatures between 100 and 200 deg. F. It is especially designed for use in electric water heaters.

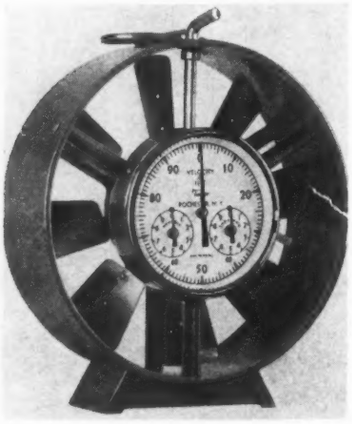
An adapter tube 3-in. long is furnished with standard pipe thread for insertion in the tank, the thermostat

snapping in place by means of two heavy clips. Positive action is obtained by means of an especially designed actuating plate, operated directly by the expansion of the liquid in the bellows and tube inserted in the adapter. Heavy silver contacts make and break the circuits with clean action.

The thermostat is made to control several circuit combinations.

New Products . . . . . .

For your convenience in obtaining information regarding these items, use coupon on page 95.



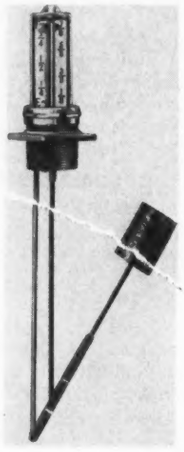
33—Anemometer

Taylor Instrument Companies, Rochester, N. Y., announces six anemometers for the measurement of air speeds, which they say are highly useful and thoroughly reliable.

Illustrated is No. 3132—Biram's anemometer—with three dials reading to 10,000 feet; 4 inch diameter; jeweled movement; disconnector; automatic zero-setting attachment; in carrying case; with corrections for use from 200 to 3000 fpm.

•34—Clear View Oil Gauge

Detroit Lubricator Company, 5900 Trumbull Ave., Detroit, announces the Clearview oil gauge for inside fuel tanks. The large 3-inch scale is easily



read and may be quickly adjusted to face in any desired direction.

Operation is through direct leverage —no gears, magnets, bolts or nuts are used. All metal parts which become submerged in oil are cadmium plated and all bearings are bronze.

35—Chalengeaire Package Unit

Lochinvar Corporation, 14247 Tireman, Dearborn, Michigan, announces the Challengeaire, a new package-unit for the low priced home—24x43x54 inches, completely assembled with the blower, motor and all controls mounted and wired.

Features claimed are: Radiator or heat economizer; access door to filters, blower and motor; fireproof filters; blower motor mounted and wired; 1,000 cfm capacity blower; heavy steel base; combination limit and blower control mounted and wired; combustion chamber door; Lochinvar multiple-stage burner with no moving parts; and oil control and transformer mounted and wired.

The STETSON SHOE COMPANY
INCORPORATED
South Weymouth, Mass.

IN REPLY REFER TO

October 25, 1937

S. T. Johnson Company,
401 North Broad Street,
Philadelphia, Pennsylvania.

Attention Mr. Robert P. Johnston
District Manager

Gentlemen:

We are now going into our third winter since our change from soft coal to a Johnson Oil Burner. We are very much pleased with the operation of this burner, saving $235.00 over the last winter that we used soft coal.

We might add that we previously used two boilers with forced draft, but since installing oil, have used but the one.

In addition to the saving on fuel, our saving on labor amounts to $2400.00.

We are very enthusiastic about the burner, and we would be very glad to have any one visit our plant and see the burner itself in operation if they are interested.

With kindest regards from the writer, we are

Yours very truly,

THE STETSON SHOE COMPANY INC.

Treasurer

AV:R

Makers of · STETSON · SHOES · FOR · MEN · AND · WOMEN ·

JOHNSON OIL BURNERS

SAVE FUEL AND LABOR

JOHNSON Oil Burner equipment was installed by the Stetson Shoe Company, South Weymouth, Massachusetts, to replace coal-burning furnaces with forced draft.

After three years of operation, company officials are enthusiastic over the Johnson Oil Burner record and report a yearly savings of $225 in fuel and $2400 in labor.

The Stetson plant is one of hundreds of factories which have found Johnson Oil Burners the most efficient and economical type of heating for industrial use.

• *Worthwhile territories and Johnson franchises available*

S. T. JOHNSON CO.

940 ARLINGTON, OAKLAND, CALIFORNIA
401 N. BROAD ST., PHILADELPHIA, PA.

MEMBER OBI OIL BURNER INSTITUTE

THERE'S A JOHNSON OIL BURNER FOR EVERY PURPOSE

EXTRA PROFIT EASY-TO-EARN

Sell a Cook No. 12 Heat Control with every job—it gives you an extra, easy-to-earn profit that you ought to have.

Every new heating job you sell for hand-firing operation is a prospect for a Cook Control. You'll be surprised how many you can sell when you explain how inexpensively the advantage of automatic control can be obtained with a Cook Heat Control.

In addition to the extra profit you earn on the sale of Cook Controls, you'll give your customers a better job. And their good will is worth many dollars to you in future business.

It's good business for you to sell a Cook Control with every job. Let us tell you why. Write today.

COOK THERMOSTAT

QUIET—in its operation

DEPENDABLE—
in its performance

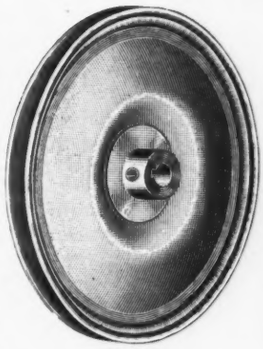
COOK CONTROLS

THERMOSTATS—FURNACE LIMIT CONTROLS
ZONE CONTROLS—BLOWER CONTROLS

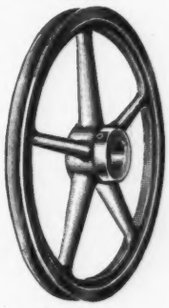
COOK ELECTRIC CO.

2673 Southport Avenue Chicago

MAUREY Pulleys *and* Fans



Steel



Cast Iron

Solid Steel

Quiet Fan

For Trouble-Free Service with F. H. P. Motor Installations in Stokers, Blowers, Fans and Air Conditioning Units.

MAUREY Pulleys and Fans are designed and built to perform quietly and efficiently in units where dependable, continuous operation MUST be maintained day after day without let-up.

MAUREY Pulleys and Fans are accurately made, balanced and true-running; attractively finished in aluminum lacquer.

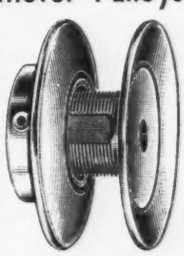
Large stocks, in a wide variety of sizes assure manufacturers and distributors adequate continuous supplies of single and double groove pulleys for both "A" and "B" Belts.

Fans are available in sizes from 6½" to 16" in diameter.

WRITE FOR CIRCULARS GIVING PRICES AND DESCRIPTIONS.

MAUREY Variable Pitch Diameter Pulleys

Solid steel construction. Adjustment permits speed variation of as much as 30%. Fine, accurate, milled threads, 20 to the inch, assure close adjustment. Designed for Air Conditioning Units. Solid steel—not die cast. Made in 4 sizes, 3¼" to 4½ inches in diameter.



MAUREY MANUFACTURING CORP.
Wabash at 29th, Chicago, Illinois

New Products . . . . . .

For your convenience in obtaining information regarding these items, use coupon on page 95.

•36—Stokertimer

The Minneapolis-Honeywell Regulator Company, Minneapolis, announces the Stokertimer, a new control for use with coal burners or stokers.

The Stokertimer is a line voltage device and is used in connection with a line voltage controller which may be

a thermostat, a Pressuretrol or a relay.

A simple synchronous motor rotates a cam which operates a mercury switch to provide the switching action for starting and stopping the stoker at the desired intervals. Easy adjustments are provided to give suitable stoker "on" periods at hourly or half-hourly intervals. The connection terminals are arranged to permit a separate load circuit if desired, i.e., a separate starter on a three phase line.

◆

•37—Spray-Booth Compound

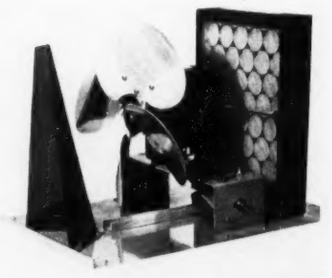
Maas & Waldstein Company, 438 Riverside Avenue, Newark, New Jersey, announces a new spray-booth compound, which facilitates cleaning of spray booth and, therefore, helps to reduce both the fire hazard and the marring of finished work by dirt spots.

To comply with the regulations of the National Board of Fire Underwriters and to maintain high standards of safety, workmanship, and housekeeping, the flammable and unsightly residues that collect in a spray booth must be frequently cleaned out.

The new M & W spray-booth compound makes the cleaning of a spray booth a simple matter. All exposed surfaces of the booth are covered with the compound, which is a non-hardening, but non-oily, paste, applied with a brush. The residues from the sprayed lacquer, paint, or enamel are deposited on the compound; and, when it is desired to clean the booth, the compound and the residues are easily and completely removed with a putty knife.

△38—Air Booster and Conditioner

Wayne Automatic Relay Co., Fort Wayne, Indiana, announces a new type combination air booster and conditioner unit. The unit is installed in any one of the cold air ducts, at a point near the furnace, and moves the gently warmed air off the bonnet of



the furnace at 136-150 degrees to all, including the remote and hard-to-heat rooms.

The heavy-duty ventilating fan, turning at either 900 or 1450 cfm of cleaned air proportioned by a diversion plate that is adjustable in order to compensate for the variable position of the cold air pipes, draws air through an Owens-Ford Fiberglas filter. The diversion plate is also designed to force the air upwards, leaving no dead air pockets around the furnace.

The fan is mounted on live rubber to insure quiet operation.

This Year Make Yourself Some Dough! with the *Complete* PREMIER Line

Here's a compiete line of home comfort equipment that has everything a smart dealer looks for—construction . . . appearance . . . and price. Here's a manufacturer that works with you 1000% to help you cash in on this great PREMIER line.

EXCLUSIVE FRANCHISE . . . 9-POINT DEALER PLAN

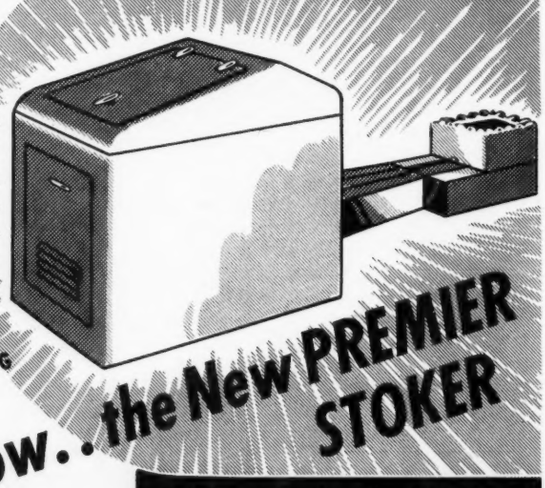
First, PREMIER protects you with an exclusive franchise. Second, PREMIER gives you expert help that strikes straight to the heart of your problems, in advertising . . . selling . . . engineering installations . . . and financing.

Field engineers work right with you, on the firing line. Headquarter's engineers prepare individual plans for your installations, FREE. You get a FREE prospect follow-up service that sells 50% of your prospects. You get a wealth of advertising material . . . a financing plan that gives you ALL your money when installation is completed.

Get the dope now on this new 9-Point PREMIER Program. Write for new portfolio and catalog . . . learn how you can make yourself some real dough this year!

WRITE for New PREMIER PORTFOLIO

GRAVITY FURNACES
WINTER AIR CONDITIONING
PACKAGE BLOWERS
HUMIDIFIERS
OIL BURNERS
COOLING UNITS
CENTRAL COOLING SYSTEMS



And Now . . the New PREMIER STOKER

Today's most modern domestic stoker—engineered by PREMIER—praised by stoker authorities. Intermittent coal feed . . . new type, high efficiency burner . . . automatic overload switch . . . powerful low speed centrifugal blower. Sizes from 25 lb. to 750 lb., furnished complete with PREMIER controls.

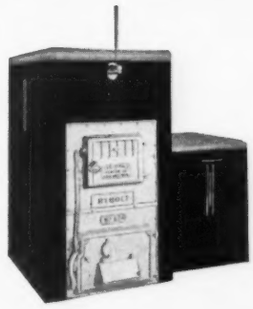
PREMIER FURNACE CO. DOWAGIAC, MICH.
Manufacturers of Warm Air Heating and Air Conditioning Equipment

RYBOLT COAL FIRED AIR CONDITIONING UNITS

for Complete-Modern Installations

AND there's half your battle! When you specify and install RYBOLT coal-fired Air Conditioning Units you know you are giving the customer the best he can get. A satisfied customer is a big asset in any business and especially so in the winter air conditioning field. Complete, modern installations with RYBOLT units will satisfy even your toughest customer and you'll enjoy the benefits of his recommendations to other homeowners.

Get into those basements NOW! Show each and every prospect how a RYBOLT coal-fired Air Conditioning Unit will not only enhance the appearance of their basements but will save them actual dollars in efficient, economical heating season after season. Write us today for further information on the RYBOLT line. We have a time tested unit for every heating need.



At left. The Series 600A7 Winter Air Conditioning Unit.

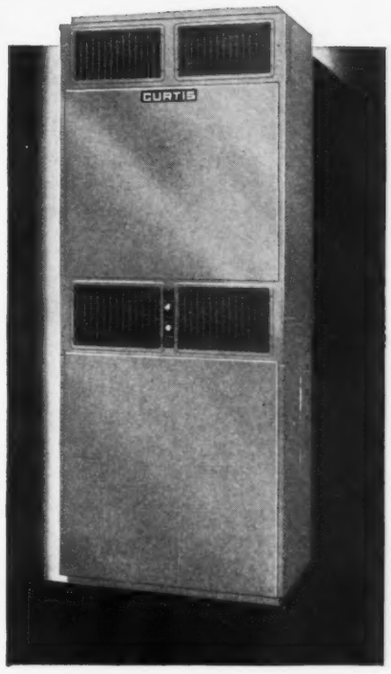
At right. The Series 157 Winter Air Conditioning Unit.

THE RYBOLT HEATER COMPANY
ASHLAND, OHIO

Announcing **the New CURTIS**

Store and Office Cooler

a new Money-Maker for you!



● The new Store and Office Cooler is the latest addition to the Curtis line of air conditioning and refrigeration equipment. It is a complete, packaged air conditioning unit, factory designed and engineered—cools, dehumidifies, circulates and filters and is adaptable for heating too. It's semi-portable, requiring only water and electrical connections, and makes economical, dependable cooling available for all types of business. Available in 3 and 5 ton sizes.

Thus the Curtis line becomes more complete than ever with the Store and Office Cooler, giving Curtis dealers an even wider opportunity for greater sales and profits. You can cover the field with Curtis equipment—Curtis experience and Curtis engineering assure user satisfaction.

CURTIS REFRIGERATION AIR CONDITIONING ... COMMERCIAL

Write to Curtis for details today.

Curtis Refrigerating Machine Co.
Division of Curtis Manufacturing Co.
1946 Kienlen Ave. St. Louis, Mo.

"Builders of Condensing Units Since 1922"

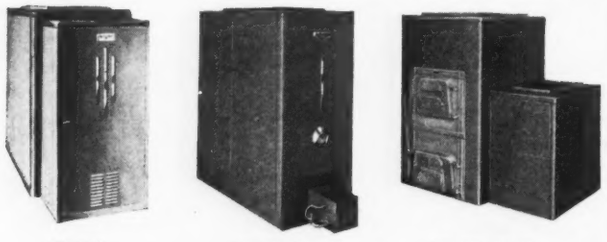
HAPPY? SURE NOW THAT I HAVE CONFIDENCE IN THE FURNACES I SELL!

• • • WHY NOT LET THE *Comfortzone* LINE DO THE SAME FOR *You?*

AMERICA'S FINEST FURNACES

You too can have confidence in the furnaces you sell if you handle the Comfortzone line, because: First, through their moderate prices you can meet all competition in either the oil, gas or coal (hand or stoker fired) jobs. Second, their construction is of the highest quality and each type of Comfortzone furnace (whether it is oil, gas or coal fired) is designed to give the utmost in heating efficiency, and this is the reason you save on costly service calls that result in dissatisfied owners. Third, the organization behind the Comfortzone line, the Michigan Tank & Furnace Corporation, will cooperate at all times on your sales and installation problems, also through their large manufacturing facilities you are assured of prompt deliveries on all orders, whether it is one furnace or a carload.
Why not get all the information right now on the Comfortzone line, and find out how your profits will grow when you handle a line that gives you confidence to sell "all the jobs" because its units are priced right, to sell the volume market.

Your Profit Line for '39



OIL • GAS • COAL

The above illustrations give you an idea of the neat compact appearance of the Comfortzone units. The oil or gas jobs are completely automatic winter air conditioning units, of green crinkle finish, while the coal units can be had in either the round or square casing with winter air conditioning if desired.

WRITE US TODAY FOR LITERATURE

MICHIGAN TANK & FURNACE CORP.
14101 PRAIRIE AVE. • DETROIT, MICH.

Association Activities . .

National

The National Warm Air Heating and Air Conditioning Association Mid-year Meeting will be held June 5, 6, 7, 1939 at Chicago, Ill., Stevens Hotel.

◆

Chicago

The annual banquet given by the Furnace, Air Conditioning and Sheet Metal Institute was held Saturday night, February 18th at Otto's Gardens, 2831 North Pulaski Road.

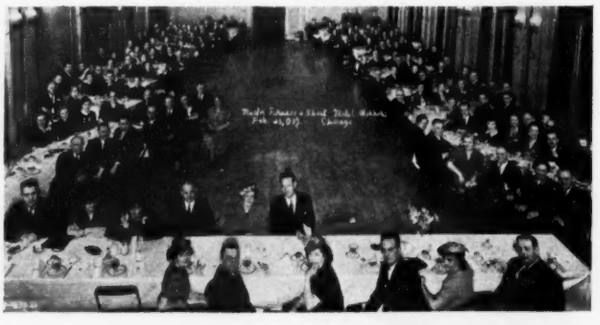
The affair started around 8:00 P. M. and due to the efforts of John Novak, entertainment chairman, was fully enjoyed by the crowd of over two hundred. An orchestra provided dinner and dancing music.

The banquet brought together prominent people in the industry and afforded an excellent chance for members to renew old acquaintances. Much credit is due the officers of the Institute—Louis Drehobl, president, A. R. Gisiner, vice-president, Marvin Lawrentz, recording secretary, and Pete Rief, financial secretary—for their untiring efforts to make this occasion a huge success.

◆

Chicago

The fifth annual banquet of The Master Furnace and Sheet Metal Association, Inc., Chicago, was held on Saturday, February 25, at the South Side Swedish Club, 7332 South Ridgeland Avenue, with Jack Titterington acting as Toastmaster.



The Banquet committee included Harry H. Kay, A. L. Nelson, Ed. Nemec, Al. Greenwald, Roy Malberg and Paul Barth.

Music was by Del-Hamlen's Orchestra—Roy Soderlind, accordianist and vocalist.

Among the guests were Louis Drehobl, president of the Furnace, Air Conditioning Sheet Metal Institute; John Bierma, president Associated Air Conditioning and Sheet Metal Contractors; and Jake Miedema.

D. C. Ellison, of the North Western Stove Repair Co., presented Past President John Spitzer with a watch.

—News Briefs—

New Incorporations

A certificate to conduct business under the firm name of Valley Heating and Air Conditioning Company, with a shop at 121 North Beacon street, Redlands, Calif., has been issued to the owner, Carl L. Grane.

◆

The Air Conditioned Heat Co. has engaged in heating, ventilating and air conditioning business in Portland, Ore., under management of Donald R. Monroe, Jr.

◆

The Cooling & Ventilating Sales Co. has engaged in air conditioning business at 4100 Ross Ave., Dallas, Tex.

◆

The Superior Metal Products Co. has engaged in the manufacture of milk and ice cream cans at 2598 Taylor street, San Francisco, Cal.

Harness the PROFIT of Summer's HEAT WAVES with "Buffalo" BREEZ-AIR ATTIC FANS

Keep the summer slump away from your door by selling your neighbors what they want most—cool, comfortable homes, during next summer's heat waves. And if you want their LASTING good will, sell them an attic fan that will give them many years of quiet, efficient, low-cost service. Sell them a Buffalo Breez-Air Attic Fan made by a company that has been specializing in fan engineering and design for over 60 years.

Better Discounts - - - Better Profits

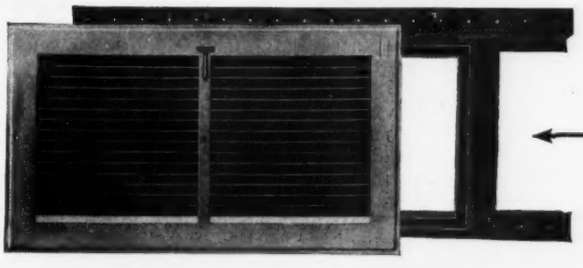
Because of the growing sales of Breez-Air Attic Fans, we are pleased to announce better list prices, better discounts and profits for qualified distributors and dealers. Write or wire for open territory and full details.

BUFFALO FORGE COMPANY

497 Broadway Buffalo, N. Y.

In Canada: Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

U. S. Presents A TRIO of HARMONY



Bringing the Sweet Music of SATISFIED CUSTOMERS

← **An Adjustable-Bar Air-Conditioning Register**

A Louver Type Directional Flow Register ↓

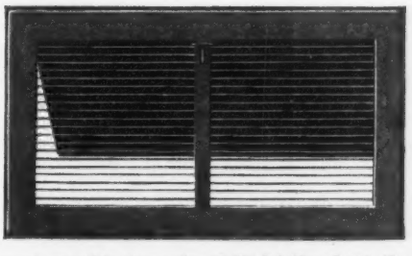
ALL COMPETITIVELY PRICED IN THEIR RESPECTIVE PRICE GROUPS

Our No. 27—1939 General Catalog includes the Industry's Most Complete Presentation of:

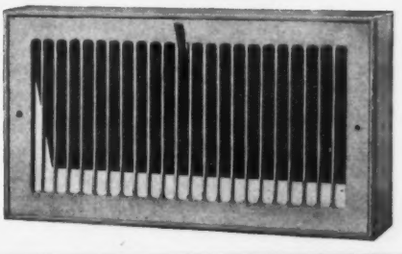
Gravity Baseboard Registers, Floor Registers, Grilles.

Air-Conditioning Registers, including the application of the New U. S. Inset Panels to Adjustable-Bar and Louver-Type Registers for all directional flows.

Screens and Furnace Pipe and Fittings. Write for a copy.



↓A Vertical Embossed Bar Register



Watch next month's issue for full details about the new line of Individually-Set and Connected Multiple Valve Air-Conditioning Registers.

US

UNITED STATES REGISTER CO.

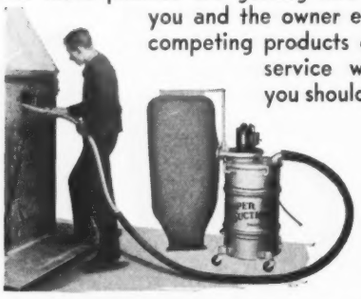
BATTLE CREEK, MICHIGAN

MINNEAPOLIS • KANSAS CITY • ALBANY • SAN FRANCISCO • NEW YORK, N. Y.

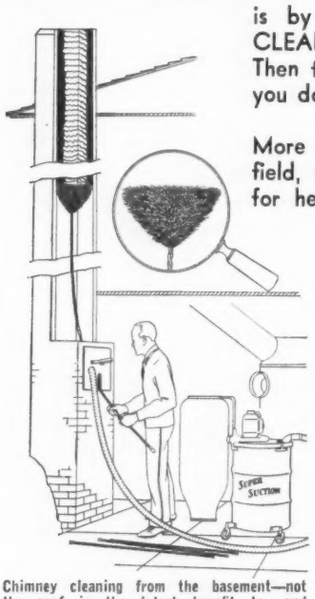
Is This Your Chance Or the "Jimmies"?

LOTS more competition than there used to be. No secret that you can lick them all. Many new and aggressive sellers have jimmied your heating plant market. Many new products, new fuels, new services. But none with your punches, if you don't pull them.

All these jimmies are getting into basements where only you and the owner ever were seen. Selling competing products on the coat-tails of the service which traditionally only you should render. How about it?



All these selling activities, directed at the owner of a heating plant, prove unmistakably that the best way to sell new plants, repairs, parts, is by first getting the job of CLEANING THE OLD PLANT. Then the things he always needs, you do sell to the owner.



Chimney cleaning from the basement—not the roof—is the latest benefit to, and does engage the interest of, the home owner. Only the Super, without extra cost, includes all the specially engineered tools you need for this important job.

More than any operator in this field, you need the best cleaner for heating plants, along with a definitely workable plan for getting lots of profitable cleaning business. Here are both—a plant cleaner which on the actual job will far outdistance your competition—and a tested and proved plan for making money on cleanings alone. Why not find out about it? Today is none too soon.

USE THIS COUPON

The National Super Service Company
1944 N. 13th Street, Toledo, Ohio

Send me the Plan Book and complete information about your free trial and the new low-priced Super.

Name .....

Street Address .....

City and State .....

News Items . . . . . .

Lettuce Preserver

Angel Sheet Metal Works, 618 Julia St., New Orleans, is now manufacturing a metal lettuce preserver, that has met with the approval of grocers, market keepers, cafes and other institutions. The firm has served the New Orleans public for twenty-five years doing a large volume of sheet metal work.

◆

Earnshaw Sheet Metal Supply

Earnshaw Sheet Metal Supply Co., has opened at 57 East Fifth Street, Mansfield, Ohio, to carry a full line of warm air heating and air conditioning supplies as well as a full line of sheets and roofing. A. G. Earnshaw, president, formerly with Wheeling Corrugating and five and a half years with Milcor Steel, has associated with him John Lynch, formerly with Wheeling Corrugating.

◆

Home Heating and Cooling

Probably the first broadcast of a whole semester's discussion of air-conditioning problems, went on the air over WILL, the University of Illinois 5000 watt station, on February 14.

The series is known as Home Heating and Cooling. The discussions are offered every Tuesday afternoon throughout the remainder of the school year and will be given by members of the teaching and research staff of the Department of Mechanical Engineering. The material presented is leveled at the home occupant. WILL operates on 580 Kilocycles.

◆

FHA Loans for Heating

The plumbing and heating industry has been a major beneficiary of business generated by the Federal Housing Administration's loan insurance program, according to FHA officials. They estimate that about $425,000,000 of the $2,000,000,000 of insured financing on the FHA's books has been spent for the products of this industry.

As of December 31, 1938, the FHA had written total insurance amounting to $2,096,000,000. This total included $1,300,000,000 of insured small home mortgages, $62,500,000 of insured mortgages on large scale rental housing projects, and $733,350,000 of insured property improvement loans.

◆

Oil Heat in Milwaukee

Enactment of an ordinance permitting installation of inside basement tanks for fuel oil storage in Milwaukee was hailed as an action permitting all home owners to avail themselves of the benefit of oil heat by C. G. Kettinger, chairman of a special legislative committee of the Oil Heating Association of Wisconsin.

"People with small lots, renters on long time leases and those who could not afford the more expensive installations of outside, underground tanks were unable to avail themselves of the many advantages of oil heat," said Kettinger. "Now the building inspector is authorized to issue permits for the installation of inside basement tanks up to 275 gallon capacity, pending formal amendment of the building code ordinance."

◆

Magnolia Building, Dallas, Air Conditioned

D. A. Little, president of Magnolia Petroleum Co. advises that the 28-story Magnolia Bldg., Dallas, Texas, would be completely air conditioned for both winter and summer. Four floors already have air conditioning. The full project is scheduled to be completed by April 1939.

Obituary

The death is reported of Ben Barrow, a heating contractor of Seattle, Wash.

Use *Randall*
PILLOW BLOCKS

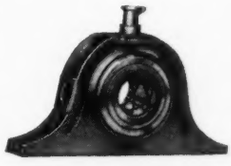
✓for QUIETNESS
✓for ECONOMY
✓for BETTER PERFORMANCE
✓for DURABILITY

Get all the above and more too by using Randall Pillow Blocks in your units. They are preferred by manufacturers because they eliminate bearing worries. Important features such as self-alignment, self-lubrication, minimum running torque, large oil capacity and extreme quiet make Randall performance unequalled.

The high quality and carefully engineered design of Randalls makes possible long life and continuous satisfactory operation in the field.

Try Randall Pillow Blocks and learn the value of a Randall installation.

Write for new catalog describing the complete Randall line.



One-piece Steel Housing Pillow Block—A low-priced constant, full self-aligning pillow block for shaft sizes from ½" to 1".

*Duplex Standard Pillow Block—For attic fan use—minimizes vibration.

**Large oilers shown at slight extra cost.*

EASTERN STOCKS

Tok Bearing Co.
177 Lafayette
New York City

American Stock Gear Co.
100 St. Clair Ave., N. W.
Cleveland, Ohio

PACIFIC COAST STOCKS

Utility Fan Corp.
Los Angeles, Cal.

C. W. Marwedel
San Francisco, Cal.

Randall GRAPHITE PRODUCTS CORP.
Dept. 311 609 W. Lake St., Chicago, Ill.

NIAGARA
No. 172
ELECTRIC
COMBINATION
MACHINE

TEN MACHINES *in* ONE

Simply plug into light socket.

Burring . . . Turning . . . Wiring . . .
Single Beading . . . O. G. Beading . . .
Crimping . . . Slitting . . . Circle Cutting
. . . Flanging . . . Elbow Edging.
Interchangeable Rolls, Fast Power Operation

Write for Bulletin

NIAGARA MACHINE & TOOL WORKS

637-97 Northland Ave. Buffalo, N. Y.

Branches: Cleveland Detroit New York

NIAGARA

Dual-Purpose Forming Machine for PITTSBURGH and DOUBLE-SEAM LOCKS

LOCKFORMER 22

Backed by years of experience in the building of Lock-Forming Machines

MACHINE-MADE LOCKS SAVE TIME AND MONEY!

- LOCKFORMER 22 produces PITTSBURGH and DOUBLE-SEAM LOCKS at a high rate of speed, in 22-gauge and lighter galvanized iron, with ½ H. P. motor.
- ONE MAN can form more locks in ONE HOUR with a LOCKFORMER, than TWO MEN can form in a WHOLE DAY, using old-fashioned hand methods.
- LOCKFORMER is Precision-Built on a Production basis.

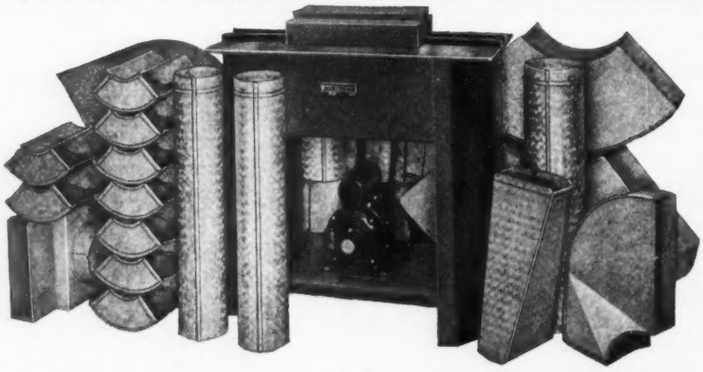
A GOOD PRODUCTION FORMING MACHINE AT A REASONABLE PRICE

PITTSBURGH LOCK MACHINE with ½ H.P. A.C. 110-220 volt, single-phase motor, complete, ready for immediate operation,

$270

(Add $25 for machine equipped with Pittsburgh, and Double-Seam Rolls.)

F.O.B. Factory, Chicago, Ill.



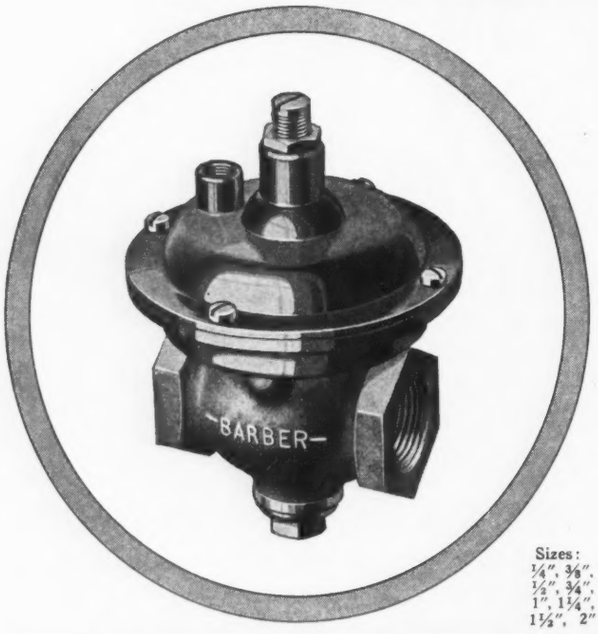
Efficiently Designed and Ruggedly Constructed.

Get your order in EARLY for prompt Spring Delivery.

For complete information, see your jobber, or write

THE LOCKFORMER CO., 4409 KINZIE ST., CHICAGO, ILLINOIS

Pick the Regulator you *know* is Dependable — a BARBER!



Sizes: ¼", ⅜", ½", ¾", 1", 1¼", 1½", 2"

A GAS pressure regulator is not a device on which it pays to take chances. Too much is involved. The name and reputation of the maker, the record of his product, are worth far more than a trivial saving in cost. For safety and certainty of operation, for positive response within narrow limits of pressure drop—you can be SURE of your Regulator when it's a BARBER.

In appearance, Barber Regulators are styled up to the minute—wholly in keeping with the modern note in gas appliance design. Compact all-bronze body, with brass working parts. Sizes ¼" to 1½" tested and certified by A. G. A. Testing Laboratory. If you make or distribute a gas-burning appliance, you will serve your customers *better* by fitting it with a Barber Regulator.

Attractive folders on this Regulator will be furnished free, at your request, for distribution to your trade. Write for catalog and price list on Barber Burner Units for Gas Appliances, Conversion Burners for Furnaces and Boilers, and Regulators.

THE BARBER GAS BURNER CO.
3704 Superior Ave., Cleveland, Ohio

BARBER GAS PRESSURE REGULATORS

With the Manufacturers . .

J. A. Johnson Joins Mercoid

J. A. Johnson, formerly sales manager of the United Electric Controls Co., at South Boston, Mass., is now associated with The Mercoid Corporation, 25 Ivy Street, Boston, Mass.

◆

Keith C. Bowers with Revere

Revere Copper and Brass Incorporated, Dallas Division, Chicago, announces the appointment of Keith C. Bowers, formerly of the St. Louis office, as its sales representative in Western Missouri and Kansas, with headquarters at 325 Ward Parkway, Kansas City.

◆

Odin Thomas with Iron Fireman

Iron Fireman Manufacturing Co., Portland, Oregon, and Cleveland, announce the appointment of Odin Thomas to the newly-created post of sales personnel manager in the general sales department at Cleveland. Mr. Thomas was formerly special factory representative in the eastern division. A new sales training program is now in preparation.

◆

International Heater Officers

At the annual meeting of the Board of Directors of the International Heater Company held in its offices at Utica, New York, January 26, 1939, the following officers were elected:

I. L. JONES.....President
L. R. TAYLOR.....Vice-President
H. F. RANDOLPH.....Vice-President and Secretary
R. L. GRIFFITHS.....Treasurer
H. A. CHESTER.....Assistant Secretary and Treasurer

◆

Copper and Brass at New York Fair

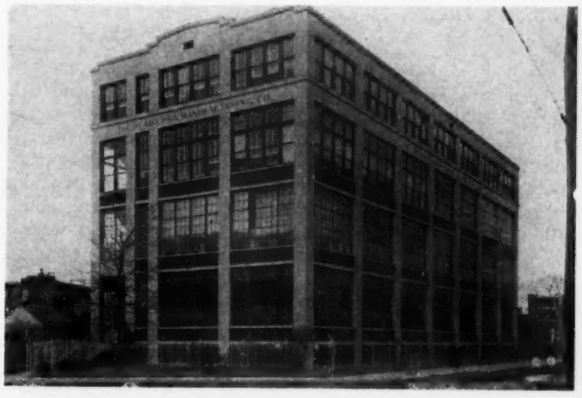
The Copper & Brass Industry Exhibit by Delineator T. Kautzky at the New York World's Fair will be one of the two largest exhibits in the metals building.

From the discovery of copper by prehistoric man down through the flight of centuries will be portrayed the part this metal and its alloys have played in the progress made by all the peoples of all the world.

◆

25th Anniversary Bead Chain

The Bead Chain Manufacturing Company, Bridgeport, Connecticut, will mark its twenty-fifth anniversary on March 17th, 1939. The company was founded by Waldo



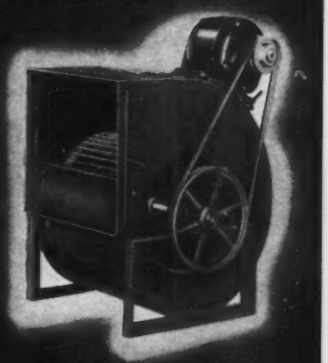
Calvin Bryant, as vice president; Gilbert Weld Goodridge, vice president; W. Gerald Bryant, president and treasurer; and David S. Day, secretary.

The Bead Chain Manufacturing Company commenced production of the first bead chain to be made in America on March 17th, 1914.

Its plant is housed in a modern four-story reinforced concrete building.

The present list of officers includes: W. G. Bryant, president and treasurer; W. D. Blatz, vice president and sales manager; David S. Day, secretary, and David S. Ross, assistant treasurer.

for Summer Profit . .
Modern Evaporative Cooling
with
UTILITY
DEZERT KOOLERS

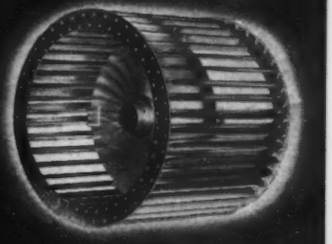


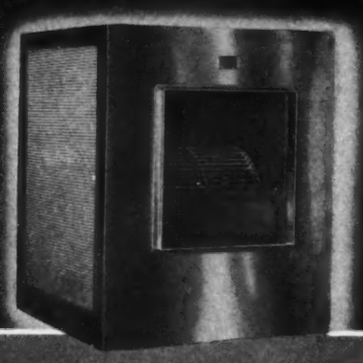
9 MODELS

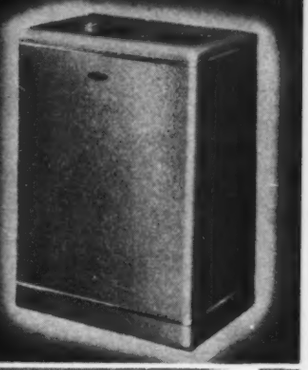
- 1,000 to 10,000 C.F.M. Including the new Inside Room Cooler.

DEZERT KOOLER FEATURES INCLUDE

- Utility dynamically balanced centrifugal blowers.
- Forward curve multiple vane blower wheels—greater output at slower rotative speeds.
- Randall graphite pillow blocks
- "No-Sag" cooling and filter pads—cannot slip or settle.
- Rust-resisting steel cabinet and lead-clad water reservoir.
- Baked enamel finish—metal trim.
- Self contained water recirculating system with self-controlled motor—standard on Inside Room Cooler—optional on Dezert Koolers at small additional cost.
- A full year's guarantee against defective workmanship or material.







THE MOST COMPLETE LINE OF EVAPORATIVE COOLERS and BLOWERS

Write for COMPLETE CATALOGS

UTILITY FAN CORPORATION
2528 Santa Fe Ave., Los Angeles, Calif.

Please send me information on your

☐ Dezert Koolers ☐ Blowers
☐ Blower Wheels ☐ Pillow Blocks

Name_____
Street_____
State_____

LAU
Announces
NEW PROFIT OPPORTUNITIES with
NITEAIR
Attic Fans

Two-tone crackle-finish brown NITEAIR
"The attic fan with eye appeal"

Revolutionary Design! Millions of homes prospects! Enthusiastic Users as far north as Canada!

A necessity in the South, the cooling comfort of attic fans is fast becoming highly popular the country over.

This summer, many home-owners in your community will buy attic fans. You can profit from these installations by selling NITEAIR ATTIC FANS. Quiet running, smart looking, NITEAIR brings cooling comfort at a price easily within the average home-owner's reach. And YOU make a NICE PROFIT on every installation. Prices are much LOWER than you'd expect!

MANY NEW IMPORTANT FEATURES

Fire proof, NITEAIR ATTIC FAN has all metal housing and vent box, many safety features.

Rubber mounting between unit and floor, on motor and bearing mountings, make NITEAIR extremely quiet. Housing sprayed with special sound-deadening material.

Sells as fan unit, or fan unit with front grille for exposure in public places; and package unit, complete with accessories. Complete range of sizes.

Write today for descriptive literature, and complete list of sizes, performance data and prices.

THE LAU BLOWER CO.
Monument at Marian St., Dayton, Ohio

With the Manufacturers .

Harold A. Matthews

The Mercoid Corporation, Chicago, announces with deep regret the passing of Harold A. Matthews, sales engineer. An accidental gun wound while hunting on New Year's day resulted in his death on January 30, 1939.

◆

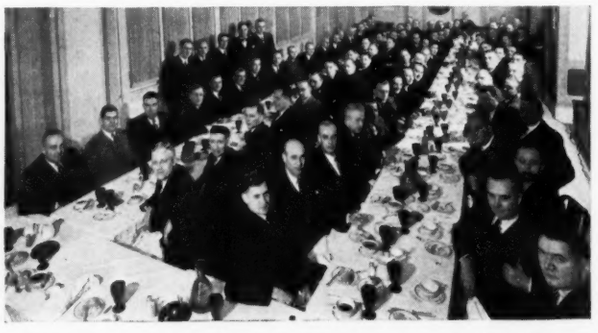
Early Summer Finance Plan

Ray G. Whipple, Treasurer and General Manager of Harvey-Whipple, Inc., announces a new finance plan available for Master Kraft dealers enabling them to take orders for burners, air conditioners, and boilers, now with no payment due by the purchaser until fall of the current year.

◆

Free-Man Distributors' Meet

Illinois Iron and Bolt Company, manufacturers of Free-Man stokers, presented the new models and sales plans at a meeting of their distributors at the Morrison Hotel, Chicago, on January 11 and 12.



Howard C. McNeil, president, spoke optimistically on the general business outlook, John M. McClintock, manager of the Free-Man Stoker Division, introduced the new 1939 stokers.

George B. Riddle, sales promotion manager, presented new advertising and sales plans, featuring the new blue-ribbon franchise.

Fred W. Cochrane, Eastern Division sales manager, was in charge of the meeting. Other executives participating were Joseph G. Beard, Frank Glenn and John Slosson, and Fred A. Delano, Chicago city sales manager.

◆

Fox Furnace Schools

Fox Furnace Division of American Radiator & Standard Sanitary Corporation, Elyria, Ohio, announces the sixth consecutive heating jobbers and dealers air conditioning schools.

The first school was held at Birmingham, Alabama. Classes were in session for three days, January 17, 18 and 19. Most of the time was devoted to the engineering and installation of air conditioning systems. Instructions were based on the 1939 edition of the Sunbeam Engineering Manual.

Recognizing the fact that sales methods are of increasing importance, Fox Furnace executives have allowed ample time in the program for the subject of sound sales and merchandising methods. The fundamentals of sales and specific ways of increasing sales by the application of Sunbeam promotion features are presented.

Major schools, conducted by Fox, have or will be held in the following cities:

Chicago, Ill...	January 31, February 1, 2
Boston, Mass.	February 14, 15, 16
St. Louis, Mo.	February 28, March 1, 2
Cleveland, Ohio	March 14 15, 16
New York City....	June 13, 14, 15

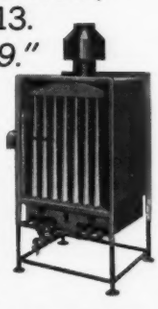
Following these major schools, Sunbeam jobbers will conduct local engineering and sales schools for the heating contractors in their territories. Heating dealers, wishing to attend these schools, can make reservations either with their local Sunbeam jobber or by writing to the Fox Furnace Division.

THAT'S WHY THE *Pacific* LINE LEADS THE PROFIT PARADE IN "39"!

Pacific Gas Heating Appliances are tailored to fit your buyer's most exacting demands in price as well as quality. Pacific has the answer to every heating problem. The most complete line of gas heating appliances manufactured in the West, by a firm established since 1913.

Tie up to the "Profit Line in '39."

★ ★ ★



IT WILL PAY YOU TO KNOW ALL ABOUT PACIFIC APPLIANCES...

★ *Including...* Gas Circulating Heaters, Radiant Circulators, Gas Steam Radiators, Wall Heaters, Floor, Dual and Single Wall Register Furnaces, Gravity and Blower Furnaces, Forced-Air Units, Duct Furnaces, Overhead Units, Blowers, Water Heaters.

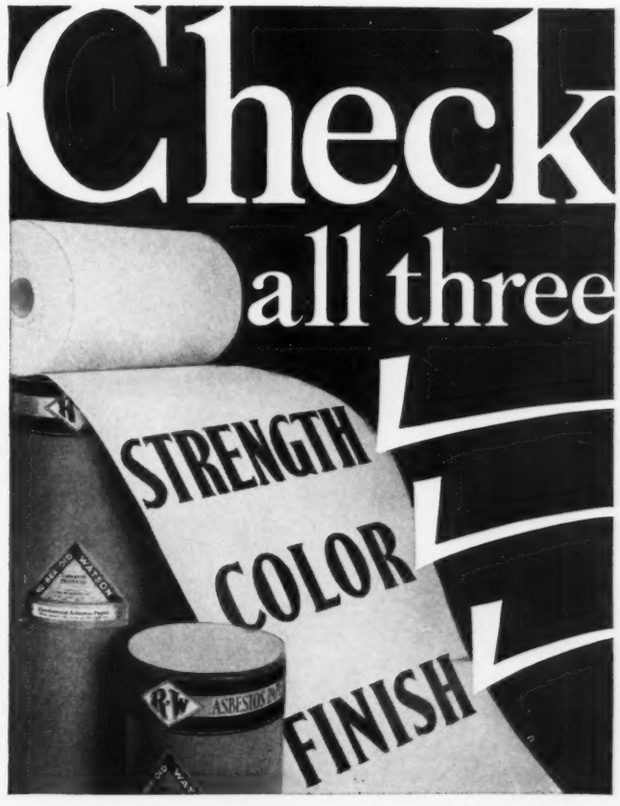
★ *Twenty-six years of continuous manufacturing experience building fine quality gas heating appliances.*

Pacific equipment carries the A.G.A. Blue Star of Approval and meets all National Safety Requirements.

Don't Delay Write Today

Pacific GAS RADIATOR CO.

1740 W. Washington Blvd. ★ Los Angeles, Calif.



You can be sure of all three features—strength, color and finish—when you use RU-BER-OID—Watson No. 43-A Asbestos Paper.

You have flexible paper of accurate caliper, made from 95% pure asbestos. You have unusual wet strength, so essential when paste is applied. You have extra strength, obtained by a special processing, not by adulterants of inflammable character.

You have the much-desired color of blue-white. You have a finish that is smooth and water-repellent on one side—rough-textured for adhesion on the other side.

These advantages make No. 43-A the ideal asbestos paper for protecting air conditioning ducts, wood partitions, wrapping furnace pipes, lining stoves, ovens and gas ranges.

Mail the coupon for a free 5-foot test sample. Compare strength, color and finish. You, too, will say No. 43-A has everything.

RU-BER-OID R-W WATSON ASBESTOS PAPERS

The RUBEROID Co., *Insulation Department* AA3-39
500 Fifth Avenue, New York City

Send us your free 5-foot test sample of No. 43-A Asbestos Paper. We understand this places us under no obligation.

Name.....

Address.....

City..... *State*.....

Since Ruberoid sells through wholesale trade only, please give jobber's name.

.....

FREE THIS CANISTER CONTAINING *5 foot Sample*

Pick the toughest drilling job you know—put a SKILSAW DRILL to work —and watch it outstrip all others in smoothness, ease of handling, drilling power and all-round performance!

There's a reason — SKILSAW DRILLS are *different!* They are better built . . . they do more work, save more in operation, cost less to maintain, *yet they cost no more!* Test them on your production or installation work, side-by-side with any other make, and you'll insist on SKILSAW DRILLS the next time you buy.

SKILSAW, INC.
4745 WINNEMAC AVENUE, CHICAGO

214 E. 40th St., New York—52 Brookline Ave., Boston—1429 Spring Garden, Philadelphia—2124 Main Street, Dallas—918 Union St., New Orleans—1253 South Flower St., Los Angeles—2065 Webster St., Oakland. Canadian Branch 85 Deloraine Ave., Toronto.

• Sold by leading distributors of mine, mill hardware and contractors' supplies.

21 POWERFUL DRILLS . . . a size for every drilling purpose

SKILSAW
SAVE MONEY IN EVERY INDUSTRY!
PORTABLE ELECTRIC TOOLS
• SAWS • DRILLS • BELT SANDERS • DISC SANDERS • GRINDERS • BLOWERS •

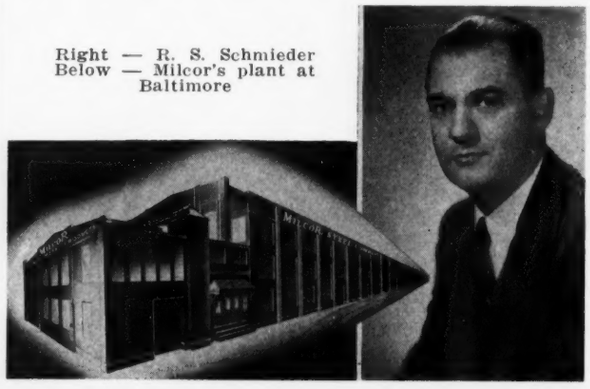
With the Manufacturers . .

Milcor Opens Baltimore Branch

Milcor Steel Company announces the establishment of a branch plant and warehouse in Baltimore at Fayette and Oldham Streets.

The entire line of Milcor fireproof building materials and sheet metal building products will be carried at the Balti-

Right — R. S. Schmieder
Below — Milcor's plant at Baltimore



more branch—metal lath and accessories, skylights, ventilators, metal ceilings, rain carrying equipment, metal roofing and siding, heating products and fireproof building specialties comprise the principal items in the Milcor line.

R. S. Schmieder has been appointed as manager of the new Milcor Baltimore Branch. For more than twenty-five years he has been engaged in the development and sale of Milcor material.

◆

Unishear Contest Winner

In the contest started last September to find the oldest "Mighty Midget" Unishear still in use, Stanley Electric Tool Division, New Britain, Connecticut, announces that the winner of the contest was located in Chicago. W. J.

Ross, manager of the Chief Sign Company, who owned the oldest "Mighty Midget," has received a brand new Unishear of the same design.

In describing his old "Mighty Midget," Mr. Ross writes that it is the company's oldest employee. "For a number of years," he writes, "it was employed in cutting metals for auto truck bodies. Now we are using it in the fabrication of electric and neon sign boxes and face. To our knowledge it has performed perfectly under all conditions and numerous types of gauges of metals.

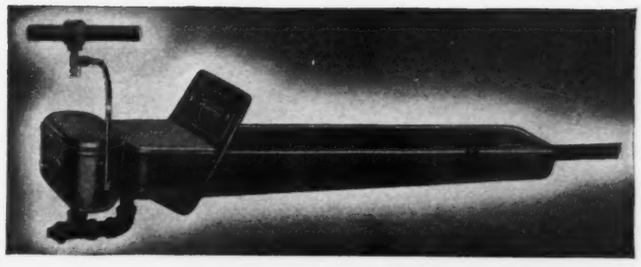
◆

Farquhar in Indianapolis

The Farquhar Furnace Company, Wilmington, Ohio, announces the formation of a new company at Indianapolis —Farquhar Heating Service Co., 3406 East Tenth Street— to handle sales and service in that vicinity.

The proprietors—T. C. Eddy, M. W. Galloway, and Wm. E. Garber—are experienced Farquhar men.

Long LIFE and Dependable OPERATION PLUS Popular PRICES mean More PROFIT to You



For 22 years the J. L. Skuttle Company has been manufacturing humidifiers, and for 22 years dealers have handled Skuttle humidifiers in preference to any other make. The reason for this is simple, when you analyze the D. S. Humidifier and compare it feature for feature with all other humidifiers. You will find that Skuttle's quality construction does give a lifetime of dependable service and because it is popular priced you can increase your sales and thereby realize more profit on each sale. Let us prove to you that more profit can be made on the Skuttle line. Write us today, and you'll have complete details within several days.

WRITE TODAY FOR **Skuttle** INFORMATION

J. L. SKUTTLE COMPANY — AUTOMATIC HUMIDIFIERS — 999 FRANKLIN ST., DETROIT, MICH.

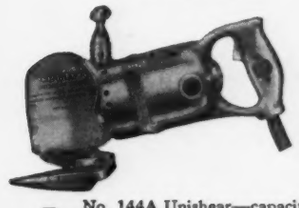
THE WINNER OF STANLEY UNISHEAR CONTEST

12 YEARS' PROOF OF UNISHEAR QUALITY, PERFORMANCE

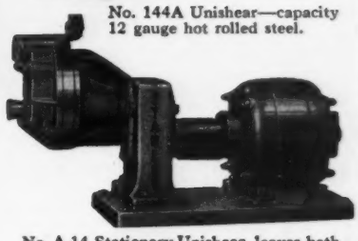
Chief Sign Company, winner of contest to find oldest Unishear, says of their "Mighty Midget": "It's our oldest employee. Used for many years cutting metal for truck bodies, now used in fabrication of electric sign boxes and faces. Handled carefully or carelessly, it has stood up twelve years with only the cost of a minor repair."

Stanley Unishears, portable and stationary, make records wherever sheet materials are cut. They follow any pattern with hairline accuracy and do the job quicker, cleaner, easier and at lower cost. Ask for a demonstration, or write for literature. Stanley Electric Tool Division, The Stanley Works, 131 Elm Street, New Britain, Connecticut.

"Mighty Midget" — capacity 18 gauge hot rolled steel. (Also No. 16—capacity 16 gauge hot rolled steel.)



No. 144A Unishear—capacity 12 gauge hot rolled steel.



No. A-14 Stationary Unishear, leaves both hands free to guide heavy work. Cuts curves down to ¼" radius. Capacity 14 gauge hot rolled steel.

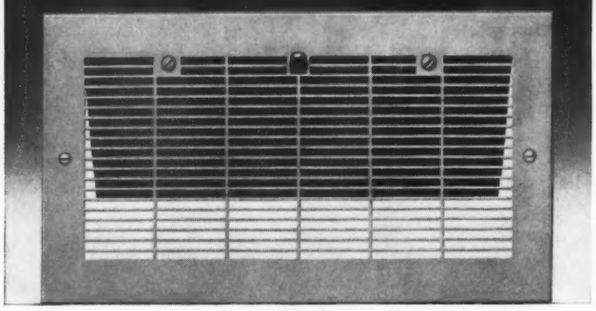
Other stationary Unishears with capacities up to ¼" boiler plate.

Stanley Unishears THE ELECTRICALLY-DRIVEN HAND SHEARS

INDEPENDENT

Wrought Steel

AIR CONDITIONING REGISTERS AND GRILLES



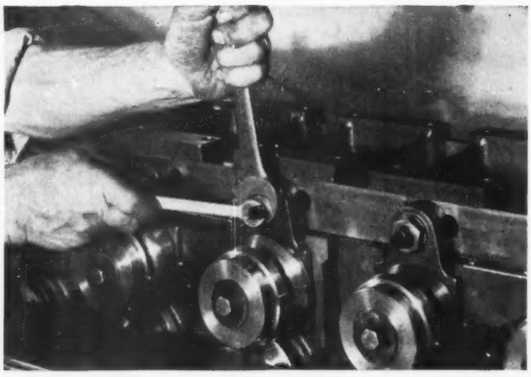
No. 136 Wall Register

● Faces are made of perforated metal. Attractive and very moderately priced. Specially designed for low cost installations. Send for circulars.

THE INDEPENDENT REGISTER CO.
3747 EAST 93RD STREET CLEVELAND, OHIO

BENDING BRAKES **WHITNEY-JENSEN** METAL TOOLS

Consider This
when buying a Rolling Machine



Are the Rolls—especially the #3 Roll—INDEPENDENTLY Adjustable?

25 YEARS TRADE W MARK SHEET METAL TOOLS

THE No. 3 roll is most important as it controls the depth of lock pocket and the fitting of the front seam. On our No. 75 Rolling Machine this roll (and the others) may be independently and quickly adjusted to produce smooth, accurate work. *This is one of many GREATER VALUE features on this machine.*

Write for particulars.

WHITNEY METAL TOOL CO. • 97 Forbes Street, Rockford, Illinois

New Literature . . . .

For your convenience in obtaining copies of new Literature, use the coupon on page 95.

114—Insulation Materials

Grant Wilson, Inc., 4101 W. Taylor St., Chicago, is distributing wholesalers' costs sheets and catalog of insulation materials for plumbing, air conditioning and heating, dated February, 1939.

◆

115—Three Ways to Install

Hart & Cooley Manufacturing Co., 61 W. Kinzie St., Chicago, is distributing an envelope stuffer illustrating 3 ways to install their No. 40¼ Damper Regulator Set. List prices are included. All parts are rustproofed. Bearings are solid steel.

◆

116—Attic Ventilators for Summer Comfort

Diehl Manufacturing Company, Electrical Division of The Singer Manufacturing Co., Elizabethport, N. J., is distributing Catalog No. 1957—"Quiet Attic Ventilators for Summer Comfort." Price list is included.

There are general suggestions, installation operations are listed, attic openings are discussed with regard to size and location, and a page is devoted to flat roof installations.

◆

117—Fans for 1939

The Emerson Electric Manufacturing Co., St. Louis, is distributing "Emerson Electric Fans for 1939"—a colorful catalog featuring for the 25th consecutive year their 5-year Factory-to-User guarantee plus seven new models with improved performance and design. Twenty-six pages list nearly a hundred types, including exhaust and ventilating fans. Descriptions, detail construction features, performance and prices are given.

◆

118—New Air Conditioning Catalog

Carrier Corp., Syracuse, N. Y., presents air conditioning equipment for the many uses from a single room to an entire building, in the new sixteen-page catalog. As an easy means of quick reference, all products are listed according to application and type of equipment.

In addition to air conditioning for homes, stores and offices, refrigeration and heating are included. Each type of product is described according to application, function, advantages, operation, installation, dimensions and sizes.

◆

119—Portable Electric Tools

The Van Dorn Electric Tool Company, Towson, Maryland, is distributing its 1939 catalog of portable electric tools and accessories.

The new catalog covers the entire Van Dorn line of 114 different portable electric tools—drills, tool chests, drill stands, hole saws, screw drivers, nut runners, tappers, saws, hammers, Lectro-Shears, bench grinders, portable grinders, heat gun, glue pot, sanders, surfacer, polishers, vacuum cleaner, valve seat grinders, valve lapper, valve shops and valve refacers, as well as attachments and accessories.

Refinements in design and construction, as well as several entirely new items, may be noted.

◆

120—Thermo-Drip Humidifiers

Automatic Humidifier Company, Cedar Falls, Iowa, announces a new catalog, describing Thermo-Drip automatic humidifiers for warm air heated homes, stores, etc. The book not only outlines the general operating and construction characteristics, but also illustrates and describes each part entering into the complete assembly. One of the highlights of this catalog is an attractive full-page illustration of the many sizes of stainless steel pans with which it can be furnished. Auxiliary equipment and optional styles for specific types of warm air heating systems also are shown. The catalog will be sent upon request to any one interested in the sale of this type of equipment.

New Literature . . . .

For your convenience in obtaining copies of new Literature, use the coupon on page 92.

121—Capacitor Motors

General Electric Company, 1 River Road, Schenectady, N. Y., is distributing Bulletin GEA-2915 covering the general purpose capacitor motor. The text covers applications, construction, characteristics, modifications, ratings and advantages.

◆

122—Dial-Indicating Thermometers

C. J. Tagliabue Mfg. Co., Park and Nostrand Avenues, Brooklyn, is distributing Catalog No. 1170—"Tag Dial-Indicating Thermometers" for use on hot water service tanks and lines, in the power plant and stock storage and other rooms. Price list is included.

◆

123—Star Marvelaire

Star Radiator Company, 649 Ceres Avenue, Los Angeles, is distributing a 6-page folder illustrating and describing their 1939 Eskimo and Sta-Cool models. Both furnish winter heating plus summer cooling. There is also a gas-fired winter air conditioner, an atmospheric cooling tower for outdoor use and a forced air type tower for indoor use.

◆

124—Time Saver Damper Control

Goese Manufacturing Co., 2548 North 18th Street, Milwaukee, is distributing a small envelope stuffer with space for dealer imprint illustrating and describing the Goese cold rolled steel bearing time saver damper control consisting of three parts—tail piece, threaded stud and wing nut including four rivets—for use on round or square duct. Screw slot on threaded stud shows position of the damper.

◆

125—Lockformer 22

The Lockformer Co., 4409 W. Kinzie St., Chicago, is distributing a 4-page folder describing and illustrating their Lockformer 22—a high-speed, dual-purpose lock forming machine especially designed for the rapid and economical production of the Pittsburgh (or corner) lock and the double-seam lock. The makers say the Lockformer enables one man, in one operation, to produce these locks at the rate of approximately 35 feet per minute. The capacity is 22-gauge and lighter, and the machine is precision-built to .0005-in. accuracy.

Another folder contains a sample of the locks formed on the Lockformer.

FOR YOUR CONVENIENCE

American Artisan, 6 N. Michigan Ave., Chicago, Ill.

Please ask the manufacturer to send me more information about the equipment mentioned under the following reference numbers in "New Products" and "New Literature."

(Circle numbers in which you are interested):

18	19	20	21	22	23	24
25	26	27	28	29	30	31
32	33	34	35	36	37	38
114	115	116	117	118	119	120
121	122	123	124	125		

Name .....Title.....

Company .....

Address .....

Are you Manufacturer———Jobber———Dealer———

FAST SALES

and more of them

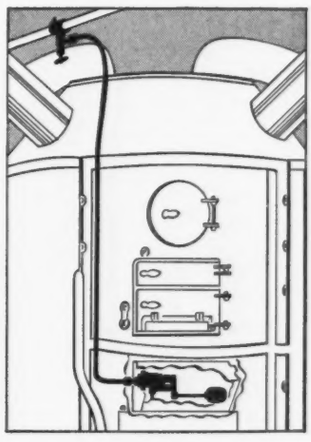
M-VB humidifier valve needed by every warm air furnace owner

Complete, ready to install in thirty minutes, this expertly-built Morency-Van Buren product fits into your tool kit. Many's the wise Master Plumber who goes out on a repair job, and sells this — *because he has it with him!*

Observe the sales points: By keeping water at the right level for proper humidification, it promotes good health . . . makes *less* fuel necessary for comfortable temperature. Long life is built into it by preventing corrosive matter from reaching the working parts.

And you need not drop the fire of any warm air furnace to install it.

Today — ask your wholesaler, or communicate with Morency-Van Buren, Sturgis, Michigan. Make *yourself* some extra money on every job where there's a warm air furnace in use.



SCOVILL *Masters of Metal*

M-VB MORENCY-VAN BUREN DIVISION
SCOVILL MANUFACTURING CO.
Sturgis, Michigan

SCOVILL SAVES YOU TIME IN SELLING—TIME IN INSTALLING

Complete lines of water closet tank fittings and humidifier stocks also maintained at Waterville, Connecticut and San Francisco

"BB"
The mark of quality on sheet metal and roofers' supplies
BERGER BROTHERS CO.
229-237 ARCH STREET, PHILADELPHIA, PA.
EAVES TROUGH
GUTTER HANGERS
CONDUCTOR PIPE
CONDUCTOR FASTENERS
MITRES
END PIECES AND CAPS
CONDUCTOR HEADS
ORNAMENTAL STRAPS
VENTILATORS, ETC.

METALBESTOS
NON-CORROSIVE
Listed Under Re-examination Service of
UNDERWRITERS' LABORATORIES, INC.
(File MH 2848—Oct. 26, 1937)

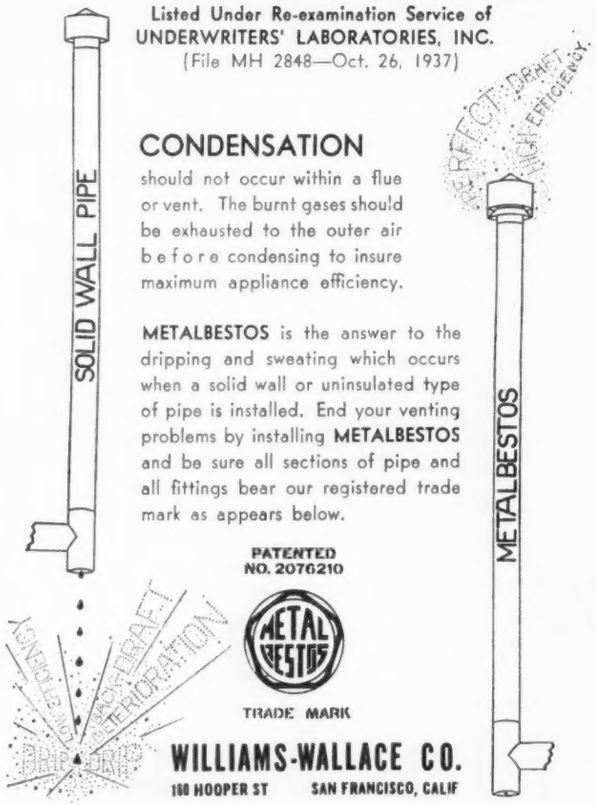
CONDENSATION
should not occur within a flue or vent. The burnt gases should be exhausted to the outer air before condensing to insure maximum appliance efficiency.

METALBESTOS is the answer to the dripping and sweating which occurs when a solid wall or uninsulated type of pipe is installed. End your venting problems by installing METALBESTOS and be sure all sections of pipe and all fittings bear our registered trade mark as appears below.

PATENTED
NO. 2076210

METAL BESTOS
TRADE MARK

WILLIAMS-WALLACE CO.
150 HOOPER ST SAN FRANCISCO, CALIF



Soldering Stainless Steel

(*Continued from page* 46)

particularly important to eliminate grease or oil and, if they have penetrated into the metal, chemical cleaning is recommended. After cleaning, the material should be immediately fluxed to prevent oxidation.

Fluxing

Flux is required to dissolve oxides formed during pre-heating. "Handy Flux," made in a convenient paste form, can be applied easily with a brush wherever the brazing alloy is expected to flow. This flux starts to melt and dissolve oxides at 900° F. and is extremely fluid and active at 1200° F. It is a good heat indicator, for when it is extremely fluid the brazing heat has been reached and the brazing alloy can be applied. In bringing work up to brazing temperature, do not concentrate the flame on one spot but keep the torch in motion to assure an even heating at and adjacent to the surfaces to be joined. This will prevent overheating the flux as well as the metals being joined. "Handy Flux," evenly heated, is stable up to 1600° F.

Heating

Great care not to overheat the metal is essential, because the copper in silver solders has a tendency to penetrate into the grain boundaries. This will penetrate entirely through the sheet if sufficient heat is applied, resulting in minute checks or sometimes large cracks upon cooling. Silver brazing alloys are expensive and most operators bring their work up to the melting point of the alloy and apply it sparingly, maintaining only sufficient heat to draw the alloy into the joint. A silver brazing alloy having a low melting point is preferable, since those melting at high temperatures tend to form more scale and produce greater warpage.

It is not difficult for an operator to become proficient in silver brazing. It is, however, desirable to heat evenly. This is essential in obtaining proper penetration of the brazing alloy into a joint. With operators accustomed to handling soft solders, the tendency often is to underheat. Those experienced in welding or brazing at high temperatures tend to use higher heats than required. Under-heating or spotty heating slows down the flow of silver brazing alloys, while overheating may build up oxides and affect the flux so that it will not dissolve them. However, with but little practice, the right heating technique can be learned, giving sound joints with little or no alloy remaining outside the joint. The fluidity of the flux is a good guide for operators to follow.

There are various methods of heating which are now being satisfactorily used in silver brazing operations. The most widely used method is the oxy-acetylene torch which must be adjusted to give a neutral flame. This means of heating is widely used, because it offers the advantages of rapid heat-

NEW DEVICES Designed for PROFITS

No. 58-Z
Automatic
Humidifier

Comes complete as shown with Patented Air Deflectors. Humidifier is built of bronze in 26" and 36" lengths. Water supplied through a No. 59-F Water-Boy feeder with thumb screw to adjust water line. It is fitted with enameled hood and overflow plates to fit a sloped or straight plenum of the furnace.

No. 59-F
Water Boy Safety
Feeder

This combination consists of a Midget float-controlled Water Feeder, 6 ft. of 1/4" O. D. Copper supply pipe, No. 8 Saddle Valve, 2 ft. of 5/16" Copper Tubing, and Fittings to connect feeder to humidifier. Water Feeder is housed in an enameled reservoir, 6" x 2½" x 2½", with cover and thumb screw for adjusting height of the water line.

Send for Free Catalog A-3.

MAID-O'-MIST, Inc.
180 N. Wacker Drive, Chicago, Ill.

"Business good while Boss is in Florida"

"We are sorry Mr..... was out when you phoned. He went to Florida for a vacation two weeks ago, but he will be back next week.
"Business is good while he is away. We sold four jobs last week and we think we got one job sold now.
"I'll tell Mr. .....you called and ask him to call you."
Yours truly,
XYZ (Ohio)

Complete information; name, address of writer of above letter furnished on request. Phone, wire or write The Williamson Heater Company or nearest jobber. Representative will call within 24 hours.

FREE: Complete, easily understood short method for figuring air conditioning jobs. You can complete your figures, price job in one hour flat. Write Dept. 2.

THE WILLIAMSON HEATER CO.
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TRIPL-IFE
Complete Line
Quick Service
FLO-WARM
You can triple your profits with "Tripl-ife"

G&O RADIATION

FINNED COILS

G&O FINNED RADIATION COILS for all industrial applications are available in a wide range of sizes, for high and low pressure operation.

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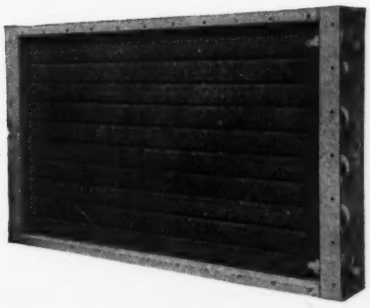

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New Haven, Connecticut
Pioneer Manufacturers of Square Finned Tubing in the United States

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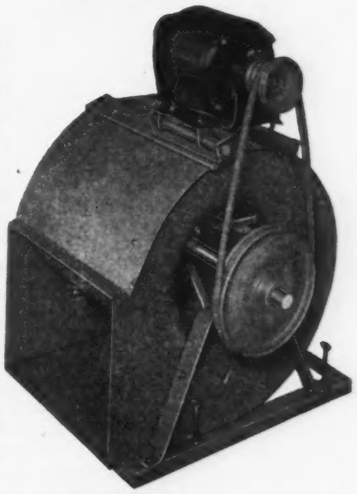
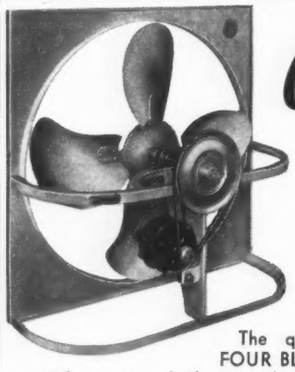
A New Service for Air Conditioning and Furnace Manufacturers

AIR CONTROLS, INC., now maintains a custom blower design department. Here a corps of air conditioning engineers are ready to work with you in developing the right blower or blower parts for any type of installation. Take advantage of this cooperation. Get the complete facts. Write today.



AIR CONTROLS, INC.
DIV. OF
The Cleveland Heater Co.
1939 West 114th, Cleveland, Ohio



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de luxe
4-BLADE
FAN

The quality of the CHELSEA FOUR BLADE DE LUXE FANS cannot be surpassed; they are designed for homes, churches, hospitals, etc. Check over the outstanding CHELSEA features listed below and you'll see why they are real profit makers.

- FIRE UNDERWRITERS' APPROVAL
- LOW COST . . . EASY INSTALLATION
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Write us today for free descriptive literature.

CHELSEA FAN & BLOWER CO., Inc.
370 West 15th St. New York, N. Y.

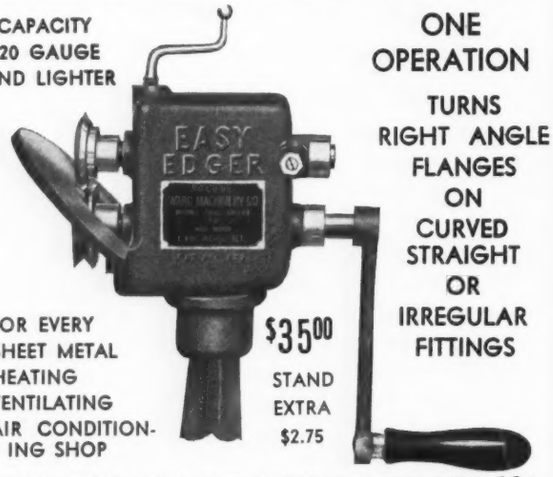
THE EASY EDGER

A FLANGING MACHINE THAT FLANGES IN—

CAPACITY 20 GAUGE AND LIGHTER

ONE OPERATION

TURNS RIGHT ANGLE FLANGES ON CURVED STRAIGHT OR IRREGULAR FITTINGS



FOR EVERY SHEET METAL HEATING VENTILATING AIR CONDITIONING SHOP

$35.00

STAND EXTRA $2.75

NOTE—WILL TURN ONE HEIGHT FLANGE ONLY (3/32)

MORE SIMPLE THAN A BURRING MACHINE | NO GAUGES TO ADJUST | SPEEDY ACCURATE UNIFORM EDGES

WRITE FOR DETAILS

WARD MACHINERY COMPANY
564 W. WASHINGTON BLVD.
CHICAGO ILLINOIS

ing and makes it possible to confine the heat to small areas. However, there are many applications where oxygen and city gas, as well as city gas and compressed air, can be used with good results, although a larger area usually is heated and more time is needed to reach a brazing heat.

The incandescent carbon method of heating offers important advantages where the work lends itself to this kind of heating. A thin sheet of brazing alloy is inserted between the cleaned surfaces to be joined. The assembly, after setting up in the brazing machine, is electrically heated through carbon blocks which form the jaws of this equipment. Parts are heated rapidly and evenly and very satisfactory joints are made by this method. A minimum of flux is required as speed of operation and the type of heating reduce the formation of oxides.

Gas, oil and electrically heated furnaces can also be used for heating, as well as furnaces provided with neutral atmosphere. This kind of heating is often used to advantage on production work.

Where fine wires or other small parts which heat rapidly are to be joined, dip-brazing is both fast and effective. Usually the silver brazing alloy is held at a temperature 50° to 75° F. above its melting point and a cover or layer of flux is kept over the molten metal to prevent the elements in the alloy which have low melting points from volatilizing.

Cleaning After Brazing

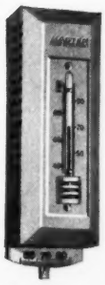
Finishing a silver brazed joint is a simple matter compared to joints made by other methods. Very little alloy stays outside of a well made joint and there is but little cleaning up work to do. Because "Handy Flux" can be dissolved in hot water, it also helps to speed up finishing operations. This flux is often spread over surfaces near the braze to protect them from oxidizing while brazing operations are being done. With the flux removed by hot water, these surfaces show up bright and clean.

Design

The foregoing deals mainly with the application of "Easy-Flo" brazing alloy and "Handy Flux," but a few words should also be included about joint design. This is a most important subject about which a great deal could be written. However, from a general standpoint, the use of a shear type joint is preferred. To obtain the highest strength, it is also important to make close fitting joints. A clearance of a few thousandths (.002"-.004") gives higher strength than greater clearances and is also more economical. Lap, scarf and lock seam joints can be used to advantage. Flat sheets, strip, pipe, tubing, fittings and formed shapes all can be permanently joined, and each job, if properly designed and due attention given to application, can be done at surprisingly low cost.

Editor's Note—Part 3 of this series, covering grinding, polishing and buffing, with tables of abrasives, will follow. If readers have particular problems, send inquiries to the editors.

TESTED AND PROVEN



No Master product is ever made available until it has been thoroughly tested and proven to be worthy to bear the Master name. The model B-22 has proven its dependability not only in our exhaustive tests, but in use under actual operating conditions in the many years it has been sold and installed all over the country.

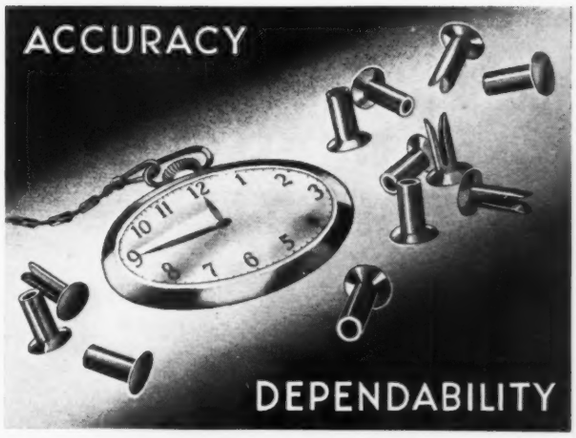
TYPE B-22

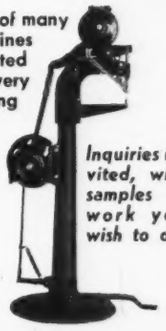
A two position heat regulator that is ideal for the small home. It is sturdily made and dependability and precision are built right into it. A noiseless device that will outlast the heating plant.

Made by the makers of the famous Type B-144, the original gradual control heat regulator.

WHITE MFG. CO.
2362 University Ave.
ST. PAUL, MINN.

MASTER TEMPERATURE CONTROLS





One of many machines adapted for every riveting use.

Inquiries invited, with samples of work you wish to do.

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There is one item in your specifications you can decide upon without hesitation—T R & S Rivets. T R & S quality means every rivet, no matter how many thousands you need, is usable; rivets of uniform preciseness, accurately gauged to drive with smoothness, to clinch with non-brittle efficiency. We have solved the riveting problems of America's leading industrial concerns.

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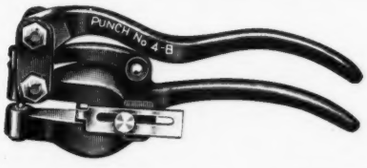
World's Foremost Producers of Rivets
WOLLASTON MASSACHUSETTS

A REAL *Time Saver*



The No. 4B PUNCH
by *Whitney*

This punch is accepted by leading contractors and dealers as a real time-saver in the shop and on the job. Men who use it every day know it can't be beat for clean, fast punching. Has a capacity of ¼" through 16 ga., weighs 3 pounds, 8½" in length, depth of throat, 2". Complete tool includes three punches and three dies of specified sizes with die adjusting key.

W.A. WHITNEY MFG. CO.
636 RACE ST. ROCKFORD, ILL

"HOME COMFORT"

1000 SERIES

Here's a thoroughly modern, highly efficient unit of the "Home Comfort" Line which will earn you handsome profits on any installation.

Handsome in design, it is fabricated of boiler-plate steel with all joints riveted for gas-tight construction. Any type of fuel may be used with striking economy.

Write us today for further information. You'll be able to meet and beat your competition every time with the "Home Comfort" 1000 Series Crescent.

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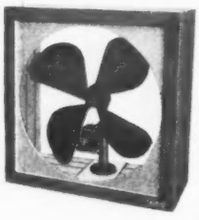
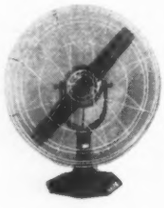
NOW! MORE PROFIT FOR YOU IN EVERY ATTIC



Reco ATTIC VENTILATOR

This new propellor type ventilator gives you brand new opportunities to get business from every home in the neighborhood. One sale leads to another. Easily installed in penthouse or wall. Ideal for home cooling. Low priced for quick sales. Correctly designed to give complete satisfaction.
Send for Bulletin



AIR CIRCULATOR FOR WINTER OR SUMMER

New Bi-Post design. Low stand or pedestal models. Can be tilted for horizontal or vertical operation. In vertical position, it forces ceiling air to circulate, revitalizes stale air, removes smoke, odors, etc. Increases heating efficiency in winter, cools without drafts in summer.
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REYNOLDS ELECTRIC COMPANY

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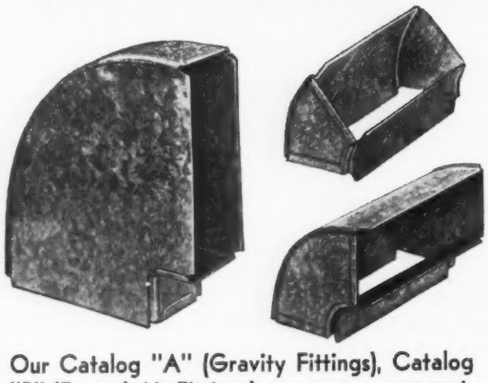
AJAX

A NEW LINE OF
PREFABRICATED DUCTS and FITTINGS
for Forced Air and Air Conditioning Installations



Our Catalog "A" (Gravity Fittings), Catalog "B" (Forced Air Fittings) are yours on request.

THE CINCINNATI SHEET METAL & ROOFING CO.
Furnace Fitting Department
230 E. Front St. Cincinnati, Ohio

Ohio's 25th Annual Convention

(*Continued from page 77*)

Association Dealer Services

W. E. Darden, Assistant to the President, National Warm Air Heating and Air Conditioning Association, pointed out the services of the association which were of direct benefit to dealers. The new codes and their use as well as the new book by Konzo were explained. Mr. Darden also explained at length the publicity campaign of the National Association and the help it should be to dealers everywhere. He closed by inviting all to the June meeting of the National Warm Air Heating and Air Conditioning Association.

Entertainment

The entertainment features of the convention were under the able direction of H. L. Orton, assisted by Oscar Hodgson, L. J. O'Conner and M. E. Lind. The Ladies Committee was ably directed by Mrs E. L. Pfeifle.

Tuesday evening the Akron association and the Salesmen's Auxiliary sponsored an entertainment with a fine floor show and dancing. On Wednesday evening the annual banquet was held with A. E. Bogen of Columbus as toastmaster. Dean Fred E. Ayer of Akron University was the speaker of the evening and the choice could not have been bettered, because of the infectious wit of Dean Ayer.

The ladies in attendance were treated to a trip through the gigantic Quaker Oats plant on Wednesday morning and were entertained by the ladies of Akron at a luncheon and bridge in the afternoon.

Auxiliary Plans

On Wednesday afternoon the annual meeting of the Salesmen's Auxiliary was held and plans made to further help the State association particularly in obtaining larger attendance at the annual conventions. Cooperative plans were discussed and L. C. Pierson of American Rolling Mill Company was detailed to work in close cooperation with the State Secretary and the local convention committee: For the year 1939-40—W. W. Kelso, Round Oak Furnace Co., Pres.; J. T. Hagan, J. M. & L. A. Osborn Co., Vice-Pres.; Homer Cunningham, Henry Furnace & Fdry., 2nd Vice-Pres.; Lee Gillespie, Ferdinand Dieckman Co., Secy.-Treas.; R. E. Myers, Perfection Furnace Pipe Co., Sgt. at Arms. Directors: F. L. Myers, Owens-Illinois; J. Wilcox, Grant Totten, Inc.; Harry Hollman, U. S. Register; A. M. Vorys, Vorys Bros., I. C. "Doc" Livingston, Agricola Furnace Co.

Memphis Home Development

Dave Dermon, old-time sheet metal contractor and realty promoter, for whom the Dermon Building on N. Third, Memphis, Tennessee, is named, has acquired a tract on which to erect seventy-five to eighty-five homes. His purchase on October 4 was 22½ acres on the north side of Jackson Avenue for immediate development.

"HAVE CLARAGE MAKE THEM"

Every year we ship to furnace manufacturers and to builders of unit air conditioners thousands upon thousands of Clarage Blower Wheels and Assemblies. These smaller units were designed with the same skill characteristic of the larger Clarage equipment — just as carefully constructed — just as carefully tested. And we have sizes to meet ALL REQUIREMENTS — with slow speed operation insuring SILENT PERFORMANCE. May we have your next inquiry?

SPECIFY CLARAGE for
COMPLETE AIR CONDITIONING
VENTILATION
HEATING
COOLING
MECHANICAL DRAFT
FANS & BLOWERS FOR INDUSTRIAL NEEDS

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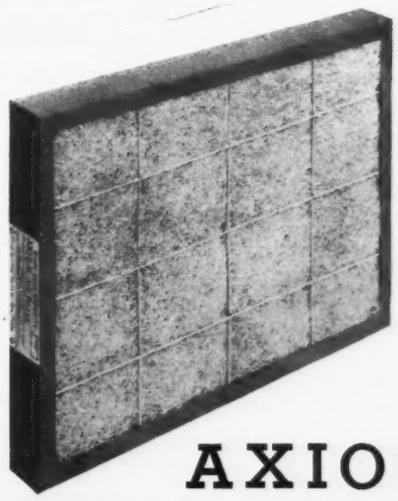
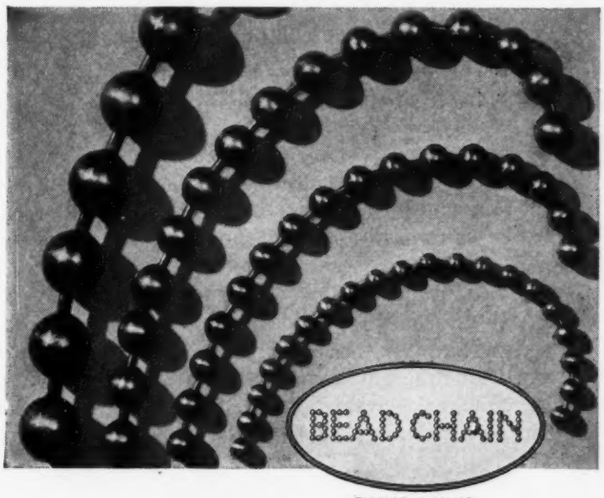
SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES



AXIOM
flame proof • replaceable
FILTERS

Highly Efficient—Low in Cost—Flameproof—Odorless. Intake side made of special Cactus Fibre insures large dust holding capacity and even build-up. Center section treated with odorless non-run oil, flameproofed. Outlet side made of Hair evenly distributed to trap and hold even the finest particles of dust. Made in all standard sizes. Write for further details and quotations.

BLOCKSOM & COMPANY
Michigan City Indiana, U. S. A.



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Wherever chain is desirable in sheet metal products you will probably find an improvement in appearance and effectiveness by the use of non-kinkable,

BEAD CHAIN*

Made in the sizes shown above, there are standard couplings and attachments for most needs, and, from our experience through 25 years of manufacturing BEAD CHAIN* we will gladly assist in its practical adaption to your products.

THE BEAD CHAIN MANUFACTURING CO.
8 MT. GROVE STREET BRIDGEPORT, CONN.
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QUALITY EQUIPMENT-- FROM HESS-- COSTS LESS

INCREASED SALES and PROFITS

Are assured if you sell Hess equipment. Why sell ordinary furnaces as sold by mail order concerns and other competitors when Hess offers superior value and performance at low prices.

THE HESS LINE IS COMPLETE
It's Different and Better.

The Hess furnace is rectangular throughout with heavy welded steel innerbody. Hess blower-filter units, oil burners, stokers, and accessories, fill every dealer requirement. Exclusive territory protection. Free plan service. FHA terms. Free consumer literature gives every advantage to a Hess dealer.

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HESS WARMING & VENTILATING CO.
1211-27 S. WESTERN AVE. Founded 1873
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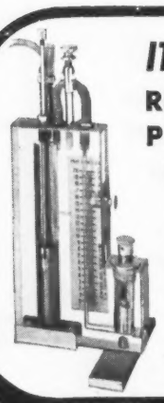

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Uniform accuracy independent of the operator's experience.

Carry in any position • No glass to break
Weighs less than 3 lbs. • Will not freeze

WRITE FOR FULL DETAILS—ALSO INFORMATION ON COMPLETE SETS FOR ALL TESTING REQUIREMENTS

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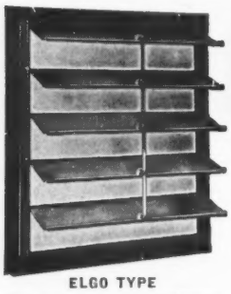

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Get our prices on Automatic Shutters, Stationary Shutters, Hand Operated Shutters, Ceiling Dampers, Balanced and Back Draft Dampers.

Elgo Ventilating Specialties

You'll Like This Automatic Shutter

You'll like it because of its exceptionally snug fit. You'll like it because it is exceptionally sensitive to air currents. You'll like it because it eliminates blade flutter. And you'll like it because it has swivel joints that never get loose or rattle. Sizes from 10" to 60" square—also rectangular.

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YEARS of trouble-free service and continuous savings in fuel are assured in every application where heat is required. JOHNSON 40 ABC Ring Burner is equipped with famous Patented Direct Jet Orifice Regulator that develops intense heat without expensive blowers or forced air-blast. These rugged burners may be used singly, doubly or 3 together as shown, to meet your needs exactly. Tops in heating efficiency with all types of gas. Send for free catalog now!

JOHNSON GAS APPLIANCE CO.
Cedar Rapids IOWA

Wisconsin Convention

(*Continued from page 37*)

teristics of radial and axial fans, their particular purposes or points of merit and the limitations which should be kept in mind in selecting one or the other of these general types.

Generally speaking, said Mr. Szekely, the axial type is designed primarily for use with a very small duct system or no duct system, exhausting directly to the outside air and not having any resistance to work against. The radial type fan or blower is designed primarily to operate against resistance or pressure and outside of selecting the blower by construction as to forward or backward curve or straight blade, the contractor finds most blowers about the same in construction and operating characteristics. The speaker explained some of the chief differences between blowers designed for straight ventilation; blowers designed for fume removal; blowers designed for the removal of materials which pass through the blades of the blower; blowers designed particularly for corrosive fumes or abrasive materials and discussed briefly the general applications of each type of unit. Points to watch in setting fans and blowers, according to the speaker, are (1) the shaft of the blower should be set absolutely level; (2) bearings should be absolutely aligned to the shaft or be of such construction that they are self-aligning; (3) foundations should be strong enough and vibrationless enough to support the weight of the equipment without vibration; (4) the blower wheel should be turned by hand to see that there is no rubbing or scraping or misallignment of parts.

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Equally important, so far as the owner's satisfaction is concerned, is the connecting duct system which should be as straight as possible, with as few fittings or abrupt turns as possible; should be fully dampered for the work to be done; should be sized for resistance or for velocity, according to the type of system desired; and should be constructed absolutely air tight. Dampers should not be placed directly behind the grilles nor very close to the inlet or outlet of the fan; there should be some break in the metal to metal construction of the duct, in brief, the construction should follow rules which have been pointed out for many years.

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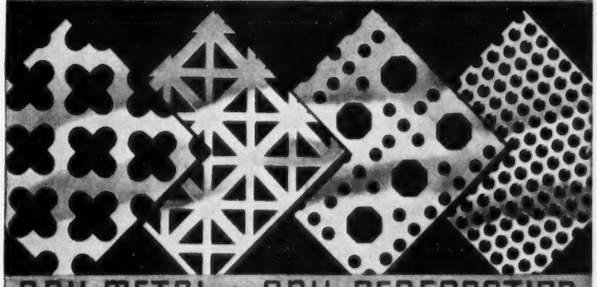

ANY METAL • ANY PERFORATION

Industrial Perforations include all sizes of round, oblong, and many special shaped perforations, for Screening, Grading, Draining and Guarding purposes. Our line is very complete.

Ornamental Perforations are used in Architectural Grilles, Radiator Enclosures, Metal Furniture, Cabinets, Stoves, etc. In addition to the standard shapes we have many exclusive and attractive designs suitable for different uses.

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Write for prices and other information.

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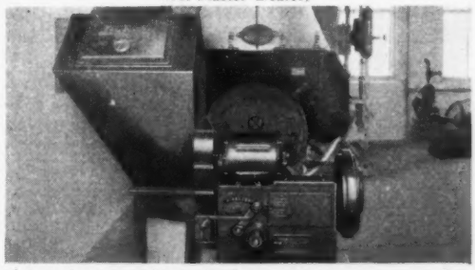
Regardless of the stoker line you handle --- you can sell*

KōL-MASTER STOKERS TO FIRE SCOTCH MARINE TYPE BOILERS *Successfully*

(*Unless you are in direct competition with a Kol-Master Dealer)



★Stop losing stoker sales because your present stoker line can't fire Scotch Marine type boilers successfully. Now . . . unless you are directly in competition with one of our own dealers . . . you can land these jobs with Kol-Master! Go after this business doubly hard this spring while domestic stokers are "off season". Write today for full details as to how Kol-Master is installed right in the fire tube . . . maintains proper combustion conditions . . . secures uniformly even coal distribution full length of the fire box! You'll be sales and profits ahead . . .

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Star Brand Rivets mean faster, smoother going on any riveting job —and assure best results.

Precision manufacture and rigid inspection insure accurate sizes and uniform quality.

Rivets are an important trifle. Use the best—Star Brand—the standard of quality for 76 years.

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COPPER BRAZIERS AND TINNERS' RIVETS
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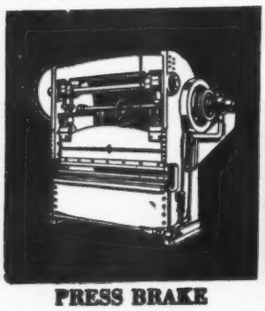

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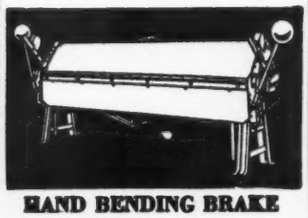

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Steel Brakes—Presses—Shears

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CHECK YOUR HEATING INSTALLATIONS

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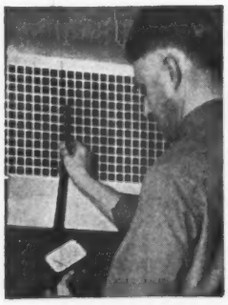

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This all-purpose air velocity meter indicates air velocities directly and instantaneously on the scale in f.p.m. without the necessity of timing or mathematical calculations. Standard range 0-300, 0-3000 f.p.m. Other ranges available up to 18,000 f.p.m.

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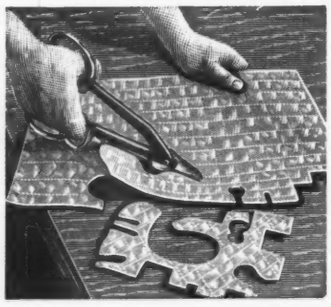

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SCROLL-PIVOTER SNIP

Cuts circles, scrolls and squares as easily as a straight line. Will cut alloy metals.

Now furnished with serrated blade unless otherwise ordered.

Use Wiss Hy-power and Bulldog Snips

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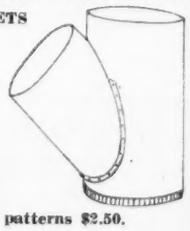
Established 1848 **Newark, N. J.**

GRAY'S FULL SIZE BLUE PRINT PATTERNS

45 DEGREE BRANCH PATTERNS IN 2 SETS



SET No. 3—2 in. to 12 in. branches on 2 in. to 30 in. diameter.....$5.00

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385 patterns in the two sets.

ELBOW PATTERNS:

SET No. 1—1 in. to 20 in. 2-3-4-5-6-7 piece, including Tee patterns 2 in. to 20 in. diameter. 152 patterns $2.50.

SET No. 2—20 in. to 40 in. 5-6-7-8-9 piece and angle chart showing what pattern and number of pieces to get required angle. 105 patterns $2.50.

SKYLIGHTS.

Hip, gable and single pitch, putty bar • Hip, gable and single pitch, puttyless, with square ridge vent and base patterns. $5.00 each.

Turret lights to operate by gearing. $3.00. Louvres—stationary and to operate. $3.00. Roof ventilators and base patterns. $5.00. Ship ventilators—6 piece 4 in. to 24 in. at base.

Patterns sent postpaid upon receipt of P. O. order or check.

G. L. GRAY, 507-511 Grand Avenue, NEW HAVEN, CONN.

Write for pattern circular giving full information.
Mention American Artisan.

Toledo Ordinance

(*Continued from page* 78)

be necessary to demonstrate the delivery of the required amount of air to the various parts of such system. No such system shall be approved by said Division until found, under such tests, to be fulfilling all requirements of these rules.

Minimum Requirements

Section 209. The provisions of these rules shall be held to be minimum requirements for the protection of the health, welfare and safety of the community.

Replacements

Section 210. Any warm air furnace, fan, blower, or appurtenance connected with any of the above, installed to replace any existing equipment of like nature in any existing plant or system shall be of such capacity as would be required under these rules were such furnace, fan, blower, or appurtenance, to be installed for use in connection with a new plant or system, as would be required by these rules, to meet the heating requirements for said building.

Alterations, Additions and Repairs

Section 211. Alterations: Any alterations hereafter made to an existing heating system or plant, in or for any building, shall be made in conformity with these rules in so far as may be practicable, in the judgment of the Division of Inspection, without impairing efficient operation of the system as a whole, or of any portion thereof.

Additions

Section 212. Wherever the heating requirements, as determined by these rules, of any existing building provided with a heating system or plant are hereafter increased, either by the construction of an addition or additions, or by an increase in the portion of said building to be heated, or in any other manner, the capacity of the heating system or plant serving same shall be increased to that capacity which would be required by these rules for a new installation designed to meet equal heating requirements.

Repairs

Section 213. Repairs to any heating equipment shall be made in such manner as to restore such equipment, as near as is possible, to its original sound condition. Such repair equipment shall be subjected to such tests as may be required, in the opinion of the Inspector, to satisfactorily prove its ability to meet the service requirements to which it may be subjected.

[To be continued]

Reciprocal Buying

(*Continued from page* 39)

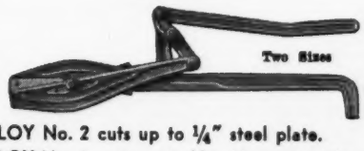
management of American business. With that proof, the New Deal can show it is necessary for government to guide, direct and protect industry, and thus only can business be kept solvent. As a matter of fact, who can show that government is not right in such conclusions? Result: One law, a million new jobs and a billion new taxes.

The worst of it is that in this case the government has a perfectly clear case to prove its point. No one can take the untenable position that reciprocal buying is anything but asinine and wasteful. However, in the hands of governmental regulation for its elimination, a waste will be turned into regimentation from which industry perhaps can never recover.

Yours very truly,
Signed, J. F. LINCOLN,
The Lincoln Electric Co., Cleveland, Ohio.

PORTABLE SHEARS

ALL-ALLOY



ALL-ALLOY No. 2 cuts up to ¼" steel plate.
ALL-ALLOY No. 1 cuts up to No. 11 gauge strip or sheet.
Special blades may be had for shearing stainless steel.

FULLY GUARANTEED

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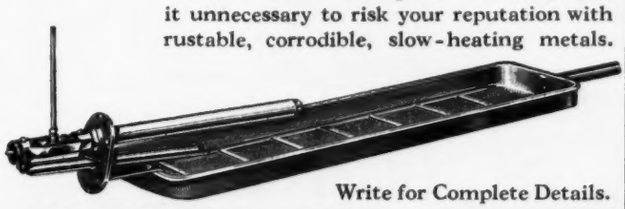
THERMO-DRIP HUMIDIFIERS

. . . with *stainless steel* pans in 12 sizes, make it unnecessary to risk your reputation with rustable, corrodible, slow-heating metals.



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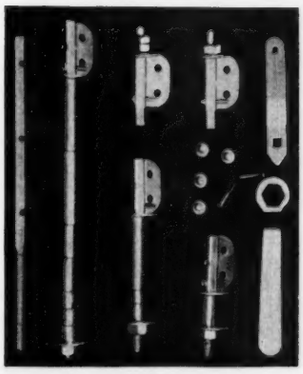
18th and Main Streets • CEDAR FALLS, IOWA

The New K-B Damper Control



A foolproof, easily installed damper that will add efficiency to your installations.

Unique construction features separate rods and holders, allowing positive locking and close adjustment. Eliminates duct deforming.

Adjustable for any insulation or furring—always shows true position. ASK YOUR JOBBER—or write direct for particulars. Send 25c for working sample and direction sheet.

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The TORNADO Furnace Cleaner

The TORNADO gets you into the basement where it is easy to sell repairs and new furnaces. And you make a profit on the cleaning job too!

Dealers say that the TORNADO is the most powerful furnace cleaner built. Leads the field! Low price—easy payments—free trial. Approved by Anthracite Institute and Underwriters Lab. Thousands in use.

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IMMEDIATE SHIPMENTS AND AT PRICES THAT ARE RIGHT

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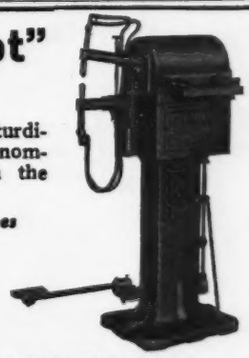

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The dealer with the most complete line has the best opportunity for sales. Peerless offers you every type of warm air heating equipment, from cast iron and steel furnaces to complete air-conditioners using all classes of fuel. Prices extremely reasonable. Liberal discounts. Get our proposition now. Make bigger profits this year.

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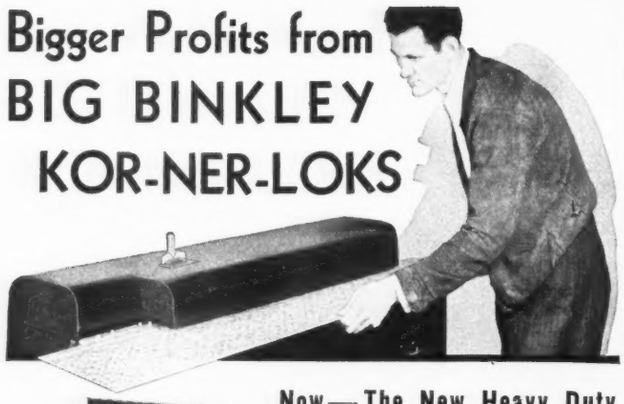
Bigger Profits from BIG BINKLEY KOR-NER-LOKS



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Illustrated—the No. 22-A Machine for 22 to 28 gauge, inclusive. Other machines for 18 gauge and lighter.

Now—The New Heavy Duty

BINKLEY KOR-NER-LOK

Fast-working Forming Machine

Cut duct work costs practically in half—do neater, better work at bigger profits for yourself, with the new, heavy duty Binkley Kor-Ner-Lok Forming Machine. Here's the sturdy, 600 pound machine you've wanted—a regular brute for turning out corner and Pittsburg Locks. You'll be glad to have this machine when you go out to bid against competition and get more jobs.

Write for details.

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Newly Modernized Rooms!

Everything planned for your comfort. Excellent food at moderate prices. You'll like the *"new"* Lenox.

RATES

Single .....$2.50 to $3.50
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Special for 2 Rooms and Bath: 3 persons $6.00; 4 persons $7.00

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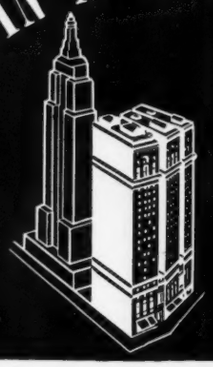

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BROADWAY AT 34th ST., NEW YORK
Under KNOTT Mgt. John J. Woelfle, Mgr.

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WANTED—Sheet Metal Worker thoroughly experienced in residential and industrial air conditioning, layout, fabrication and erection of duct work. Union shop. Address Key No. 457, American Artisan, 6 N. Michigan Ave., Chicago, Illinois.

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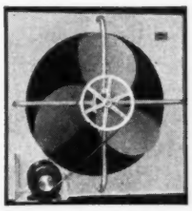

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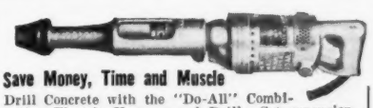

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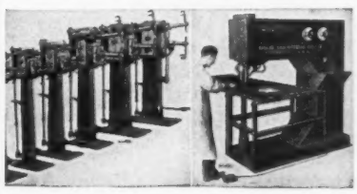

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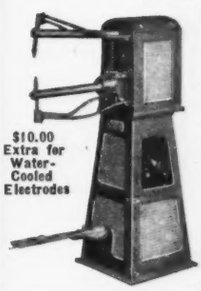

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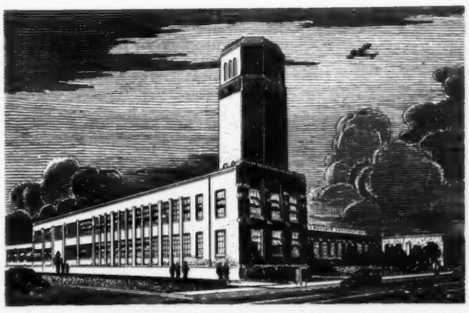
DUST is an ever present menace to exposed contacting surfaces. It builds up contact resistance, causing open arcing, pitting and subsequent trouble — a common cause for complaints, dissatisfaction and service expense. ▶ In view of the important duties dependent upon the normal operation of automatic controls, The Mercoid Corporation employs hermetically sealed mercury switches exclusively throughout all of their instruments. This assures absolute protection against current interruption caused by dust deposits. ▶ The Mercoid Switch is one of the outstanding reasons why Mercoid Controls are noted for their years of unfailing performance. Take for example the Mercoid Fan and Blower Control. It is daily increasing in popularity as time goes on. ▶ Those who know controls profit by experience. ▶ Write for catalog showing the complete line.

THIS SWITCH IS YOUR PROTECTION

BLOWER CONTROL



THE MERCOID CORPORATION
4201 BELMONT AVENUE • CHICAGO, ILL.

IT'S MERCOID EVERY TIME WHEN YOU SEE THE DIFFERENCE

You get plenty of profitable jobs from farmers with MILCOR Farm Roofing

"Tom—take my word for it—you can depend on getting water-tight protection for your barn with KUEHN'S Lock Seam Roll Roofing"

One farmer tells another about the Lock Seam feature — soon farm jobs are a profitable part of your business

Kuehn's Lock Seam Roll Roofing offers competitive sales advantages that "make sense". Cleats are concealed so they do not catch ice or snow. It's resquared on sides and ends, notched, and fastened together with a tight, strong Lock Seam to make snug joints and laps that water can't get through — and bring you the barn roofing job on one farm after another.

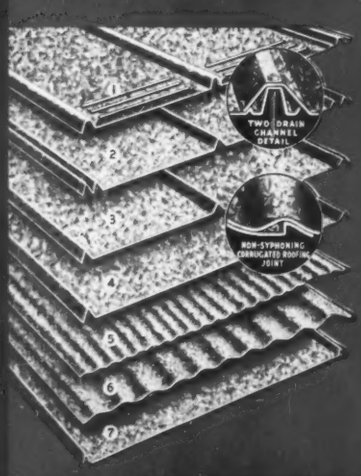
Farmers need this protection for their livestock and crops. You can depend on your Milcor job to live up to their expectations and make them glad to recommend you to others. You make money on every job, because Kuehn's Lock Seam Roll Roofing lays quickly and smoothly, and holds down labor costs.

Milcor provides a *complete* line of roofing, siding, and accessories, in a wide selection of types—everything you need to meet the farmer's requirements in a metal roof, whether for barns, hog houses, or numerous other farm buildings that provide profitable business for you.

Follow the example of hundreds of successful sheet metal men — build your business this season with Milcor. Write for latest literature on Milcor Roll Roofing.

G-36

Units of the complete MILCOR Line of Metal Roofing
Detail of Double Cross Lock
MILCOR Roll Roofing
Available in several styles and weights, all double cross locked, notched and resquared on sides and ends, offering dependable protection against water seepage.



1. Perfect Lap "Twodrain" Channel Roofing
2. 5-V Crimp Roofing
3. 3-V Crimp Roofing
4. 2-V Crimp Roofing
5. Non-Syphoning Roofing
6. 2½" Corrugated Roofing
7. Pressed Standing Seam Roofing

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